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PRINTED IN GREAT BRITAIN AT THE UNIVERSITY PRESS, OXFORD, BY VIVIAN RIDLER, PRINTER TO THE UNIVERSITY

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Chou (S.-H.), Chou (K.-H.), & Chi (C.-T.). **Wood preservatives.**—*Lin Yeh K'o Hsüeh, 1959*, pp. 327–333, 1959. [*Chem. Abstr.*, **54**, 4, col. 3827d, 1960.]

In tests to determine the efficiency of various chemicals in the prevention of decay in birch (*Betula platyphylla*) caused by *Polystictus* [*Polyporus*] *hirsutus*, *Polystictus versicolor*, and *Lenzites betulina* the best results were given by either birch tar oil (with or without $ZnCl_2$ and NaF) or either of the 2 compounds with clay pastes. The efficacy of the preservatives was increased by water-repellents, such as petroleum tar, birch tar grease, or asphalt.

Disease control in vegetable growing.—*Agric. Gaz. N.S.W.*, **71**, 1, pp. 26–31, 4 fig., 1960.

This article from the Biol. Branch, Dept Agric., briefly outlines the sequence of events involved in growing vegetables and indicates measures which should be taken at each step to minimize losses from disease. Recommended seed treatments for vegetables are tabulated.

Pirone (T. P.), Pound (G. S.), & Shepherd (R. J.). **Purification and properties of Cauliflower mosaic virus.**—*Nature, Lond.*, **186**, 4725, pp. 656–657, 1 fig., 1960.

Techniques similar to those used for purification of cucumber mosaic virus [**38**, 646] were applied at Univ. Wis., Madison, to purify cauliflower mosaic virus from the leaves of young tendergreen mustard plants (*Brassica perviridis*) inoculated with cabbage virus B [str. of cauliflower mosaic virus: **24**, 438]. The process is described and the data from electron-microscopic, density gradient tube, and sedimentation examinations of the material from healthy and infected plants are outlined. The purified virus appeared as numerous uniform spheres with av. diam. 50 mμ. It did not react with normal rabbit serum or with antisera of turnip yellow mosaic and turnip mosaic viruses, viruses which did not react with cauliflower mosaic virus antiserum.

Lovisolo (O.) & Benetti (Maria P.). **Virus e piante spontanee. II. Nuovi ospiti del virus della maculatura anulare nera del Cavolo.** [Viruses and wild plants. II. New hosts of the Cabbage black ring spot virus.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **17** (*1959*), 1, pp. 61–70, 7 fig., 1960. [Engl. summ. 7 ref.]

The presence of black ring spot virus in 5 wild hosts, 3 apparently new, growing near Rome is reported. The most frequent symptoms were veinbanding, mosaic, and malformation of the leaves. Of the *Diplotaxis erucoides* plants examined, 42% were infected.

Macfarlane (I.) & Last (F. T.). **Some effects of Plasmodiophora brassicae Woron. on the growth of the young Cabbage plant.**—*Ann. Bot.*, N.S., **23**, 92, pp. 547–570, 19 graphs, 1959. [41 ref.]

At Rothamsted exp. Sta., to ascertain whether infection of cabbage (var. King of Hearts) by *Plasmodiophora brassicae* [**38**, 43, 652] could be controlled by griseofulvin [**36**, 815], quantitative analysis was made of the effect of infection upon the growth of the host. It was found that clubs due to the disease developed at the expense of the tops and fibrous roots, especially the latter. The succulence of the shoot was unaffected. Increase in total leaf area closely paralleled increase in total dry wt., being slower in affected than in healthy plants and reaching a lower limit. From the 35th day after inoculation diseased plants had fewer and smaller leaves

than healthy ones and the leaves opened more slowly, 1 new leaf unfolding every 9 days as against 4 days on healthy plants. The dry wt. (mg.) of fibrous roots/unit leaf area (sq. cm.) was reduced from 1·2 in the controls to 0·79 at 20 days after inoculation, and from 1·74 to 0·38 at 82 days.

Channon (A. G.) & Keyworth (W. G.). **Field trials of the effect of aldrin on club-root of summer Cabbage.**—*Ann. appl. Biol.*, **48**, 1, pp. 1–7, 1960.

For the control of clubroot [*Plasmodiophora brassicae*: cf. **39**, 513] at the Nat. Veg. Res. Sta., Wellesbourne, Warwick, aldrin was applied as a dust worked into the soil or as an emulsion watered round the plants. In 1956 and 1957 dust (1·25% aldrin) was applied at 160, 320, and 640 lb./acre (equivalent to 2, 4, and 8 lb. aldrin, respectively), and emulsion (0·04%) at ½ pint/plant. Increasing doses gave increasing control and the emulsion gave better results than the dusts. One-half of each plot was given 2 dressings of ground limestone in 1957 at a total rate of 3·5 tons/acre; lime alone gave a degree of control equal to that of the highest application of aldrin, and lime+aldrin gave a still further reduction. In 1958, increasing doses of emulsion were tested (0–0·135% aldrin, ½ pint/plant and 0–0·27%, ¼ pint); these gave a control which increased with dosage, but the higher doses were phytotoxic. Reduction of clubbing from 'severe' to 'moderate' gave a marked increase in crop, but further reductions gave no corresponding increase.

Reinmuth (E.) & Bochow (H.). **Beiträge zur Frage des Einflusses einer organischen Düngung auf den Befall von Pflanzen durch parasitische Pilze. II. Untersuchungen über die Wirkungsweise einer Kompostdüngung auf den Infektionsverlauf des Herniepilzes Plasmodiophora brassicae Wor.** [Contributions to the question of the influence of organic manuring on the infection of plants by parasitic fungi. II. Studies on the mode of action of compost manuring on the course of infection of the club root fungus *P. brassicae*.]—*Phytopath. Z.*, **37**, 4, pp. 401–422, 4 graphs, 1960. [Engl. summ.]

In further experiments [**38**, 109] at the Inst. für Phytopathologie und Pflanzenschutz, Univ. Rostock, Germany, the number of primary infections of Maleksberger Gelbe mustard, determined by the root hair method [**39**, 513], was higher in experimental mixtures with small proportions of garden compost than in comparative variants without compost. With increasing quantities a marked reduction in infection occurred. In a compost or soil mixture with ¾ quartz sand infection was related to the organic materials. In partially sterilized mixtures (steam, heat, or alcohol sterilized) consisting of sand, sandy soil, or sandy soil extract plus compost or compost extract, infection was lower than that in similar untreated media. It could be increased again by reinfection of partially sterilized soils with [unspecified] soil organisms.

With soil or compost extracts made at 80% saturation, dilution was necessary for opt. infection, but with extracts from a sandy soil dilution was unnecessary. Infection opt. were higher with compost extracts than with sandy soil extracts. In quartz sand that had just been wetted with water or in dilutions of extracts infections were only very slight. There was a clear correlation between root infection produced by the various extracts from compost and sandy soils and the number of spores germinating naturally in the same media.

Stalder (L.), Schutz (F.), & Niklaus (L.). **Weitere Versuche zur Bekämpfung der Phoma-Strunkfäule bei Kohlgewächsen.** [Further experiments on the control of *P.* stem rot in *Brassicae*.]—Reprinted from *Gemüseb.*, *1960*, 4, 4 pp., 1960.

None of the chemicals tested at the Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau, Wädenswil, Switzerland, equalled the hot water seed treatment (25

min. at 50° C.) in efficiency and reliability for the control of *P. lingam* on red cabbage, and its continued use is therefore recommended. Seed-bed soil should be disinfected with 1% formalin (10 l./sq. m.) 3–5 weeks before transplanting, according to the soil temp., which should not be lower than 10°.

Rao (K. R.) & Thirumalachar (M. J.). **Control of black rot of Cabbage with citrinin.**—*Hind. Antibiot. Bull.*, **2**, 4, pp. 126–127, 1960.

At the Inst. Sci., Bombay, and Antibiotics Res. Centre, Pimpri, Poona, a str. of *Aspergillus candidus* was cultured on Czapek-Dox at 24–28° C. for 20 days, and then the broth filtered and acidified with HCl to pH 2 to precipitate crude citrinin. After re-filtering and recrystallization 95% citrinin was obtained, which at 1 μg./ml. inhibited all strs. of *Xanthomonas campestris* [cf. **35**, 60] tested. For seed treatment in greenhouses 5–50 μg./ml. solutions, fairly non-phytotoxic, were effective, and in field practice, with 50% extra seed rate to offset reduced germination, 50 μg./ml. ensured healthy seedlings.

Tochihara (H.). **Studies on the viruses of Japanese Radish mosaic diseases. I. Properties and morphology of Radish P virus. II. Serology of Radish P virus.** —*Ann. phytopath. Soc. Japan*, **24**, 5, pp. 287–295, 1 pl. (4 fig.), 1 graph; pp. 296–301, 1959. [Jap. Abs. from Engl. summ.]

At the Nat. Inst. agric. Sci., Nishigahara, Tokyo, radish mosaic disease [**37**, 256] is believed to involve cucumber mosaic virus, 2 viruses, P and R, related to turnip mosaic virus, and another virus, Q. These occur singly, or in various combinations. This paper deals with an isolate, Po, from Matsudo, Chiba Prefecture; it infected a number of *Brassica* spp. and vars., *Matthiola incana*, spinach, *Chrysanthemum coronarium*, and *Petunia hybrida*. Cabbage and rape were symptomless carriers. *Nicotiana glutinosa* was resistant except when the virus was combined with cucumber mosaic virus. The dilution end-point of the virus extract was 1:2,000–1:5,000, thermal inactivation point 55–60° C. for 10 min., longevity in crude juice 4–7 days at 25–26°; a freeze-dried preparation of the virus was still infective after 23 months. This isolate was not transmissible by *Myzus persicae*, which normally transmits the P virus. The purified, colourless solution of the virus retained 20% infectivity when diluted to $2–3 \times 10^{-7}$; when examined under the electron microscope, the solution contained rod-shaped particles approximately 12–13 × 650–700 mμ.

In part II it is noted that rabbit antiserum reacted specifically with leaf juice of turnip, radish, *B. pekinensis*, *P. hybrida*, *C. coronarium*, and spinach infected with P virus. In absorption tests the antiserum absorbed P virus completely. The virus dilution end points were ×300 in agglutination reactions on slides, ×2000 in precipitin reactions using turnip leaf juice, and 0·002–0·005 mg./ml. using purified virus preparations. Using the antiserum reaction and host range tests 31 plants of 76 exhibiting radish mosaic symptoms were found to be infected with a single virus, the rest being infected with 2, 3, or 4 viruses.

Zarzycka (Hanna). **Gatunki z rodzaju Fusarium występujące na Modraku (Crambe abyssinica Hochst.).** [Fusarium species occurring on Crambe (*C. abyssinica*).]—*Acta agrobot.*, **8**, pp. 169–183, 8 fig., 1959. [18 ref. Engl. summ.]

At the Plant Protection Inst., Phytopath. Lab., Reguły, Poland, 7 *F.* spp. and 2 vars., which are described, were isolated from diseased seedlings of crambe, and from the soil in which the infected seedlings had been grown.

Ernould (L.) & Van Steyvoort (L.). **La végétation, les ennemis et les maladies de la Betterave en Belgique, en 1957, . . . en 1958.** [The growth, pests, and

diseases of Beet in Belgium in 1957, . . . in 1958.]—*Publ. tech. Inst. belge Amélior. Better.*, **26**, 2, pp. 33–72, 1958; **27**, 2, pp. 83–129, 4 fig., 1959. [Flem., Engl. summ.]

Mn excess and Mg deficiency (the symptoms of the latter apt to be confused with those of yellows virus) were again observed in both years [cf. **36**, 628]. In 1957 *Myzus persicae* was more abundant than in 1956, multiplying very early both in Flanders and Hainault, with a correspondingly accelerated spread of yellows virus [see below], which infected 100% of the plants in most regions of the 2 provinces. The yield reduction in sugar and fodder beets was estimated at 23%. In 1958, on the other hand, severe cold in Mar. and Apr. destroyed nearly all the aphids on peach trees, though some survived until the beginning of May on cabbage and spinach. By July few fields contained more than 5 aphids/beet plant, with the result that yellows virus was relatively unimportant, except in W. Flanders, where the incidence reached 80%. Spraying with systemic insecticides proved very effectual in Hainault, reducing the percentage of diseased plants by an av. of 20 points in comparison with the untreated.

Ernould (L.) & Van Steyvoort (L.). **Les cartes de la répartition de la jaunisse de 1954 à 1959.** [Maps of the distribution of yellows from 1954 to 1959.]—*Publ. tech. Inst. belge Amélior. Better.*, **27**, 3, pp. 135–144, 6 maps, 1959. [Flem., Engl. summ.]

The maps are prepared by methods based on counts of plants infected by yellows virus in different Belgian beet-growing regions [see above and below] from 1–15 Sept. each year and incorporated with the European maps of the distribution of the disease drawn up by the Virus Disease Commission of the Institut International de Recherches Betteravières. It is apparent from the commentaries provided for each year that infection centres may move annually beyond those areas which are more or less regularly threatened, necessitating the yearly preparation of new maps in order to adapt control measures to local developments of the virosis.

Van Steyvoort (L.). **Ce qu'il faut savoir de la lutte contre la jaunisse de la Betterave.** [Essential knowledge concerning the control of Beet yellows.]—*Publ. Vulg. Inst. belge Amélior. Better.*, *1960*, 1, pp. 7–12, 1960.

By 1 Apr. sources of the virus [see above], e.g. fodder beets with new growth from clamps and winter spinach, should be destroyed. Beet debris should be removed from the field and aphids on seed-bearers and slips exterminated. Early sowing and dense planting (75,000 plants/ha.) are important contributory measures towards a healthy crop. Insecticidal treatments (2 at a 12–15-day interval in the centres of heavy infection, Hainault, Brabant, and Flanders, and 1 in Hesbaye and Thudinie) should be begun before the vectors become too numerous, i.e. when there are not more than 3–10 green aphids [*Myzus persicae*]/10 plants.

Bercks (R.), Steudel (W.), & Stellmach (G.). **Serologische Untersuchungen zur Frage der Diagnose symptomlos vergilbungskranker Zuckerrüben.** [Serological studies on the problem of the diagnosis of yellows in symptomless diseased Sugar Beets.]—*Zucker*, **13**, 9, pp. 324–331, 1960. [Engl., Fr. summ. 28 ref.]

In experiments during 1955–58 at the Institut für Hackfruchtkrankheiten, Aussenstelle Elsdorf/Rhld, Germany, serological methods were successful in the detection of beet yellows virus in 39% of the 1-yr.-old symptomless plants during 1956–7, the year yielding the most reliable data. At transplanting in the following spring after storage in clamps infection was recognized in a further 14% on the basis of symptoms and a 2nd serological examination. Analyses of weight and sugar content revealed no changes resultant on symptomless infection. In a further series of tests

the virus proved to be undetectable in old inoculated leaves, but it appeared in the youngest ones produced subsequently and thence spread to a limited extent to the older foliage.

WENZL (H.). **Untersuchungen über den Besatz von Rübensaatgut mit Cercospora beticola Sacc. in Abhängigkeit von Witterung und Klima.** [Studies on the infection of Beet seed by *C. beticola* in relation to weather and climate.]—*PflSchBer.*, **23**, 7–8, pp. 97–116, 1 map, 1959. [Engl. summ.]

In further studies [cf. **39**, 360] examination of about 1,000 different samples of sugar beet and mangold seed by a routine method [loc. cit.] indicated up to 150,000 conidia/g. seed, though the actual infestation was about 3 times higher. There was a clear correlation between seed infestation and the weather conditions of the areas sampled. In the plains and hilly areas of Austria (200–400 m. above sea level with high summer temp.) rainfall is decisive; at 500–600 m. the low temp. often restricts disease development. Under similar weather conditions there was more seed infestation in vars. with highly susceptible leaves than in those of a higher leaf resistance. Dark coloured seed lots were more heavily infested than light, but the difference was not sufficient to justify any conclusions.

[A shorter account of this work appears in *Pflanzenarzt*, **12**, 12, pp. 126–128, 1959.]

NÖLLE (H. H.). **Über den Wurzelbrand der Zuckerrübe und seine Bekämpfung.** [On root rot of Sugar Beet and its control.]—*Phytopath. Z.*, **38**, 2, pp. 161–200, 9 graphs, 1960. [Engl. summ. 125 ref.]

Observations and field experiments in the Bonn and Cologne districts during 1956–58 showed only few root rot diseases caused by soil-borne pathogens, but without seed disinfection there was great damage from seed-borne agents. Only a few plants died after emergence. Several preparations, with the exception of cerenox, tested at the Inst. für Pflanzenkrankheiten der Rheinischen Friedrich Wilhelm Univ., Bonn, killed enough of the seed-borne pathogens to guarantee reasonable stands. Disinfection against *Phoma* [*Pleospora*] *betae* [cf. **38**, 639] with germisan proved to be quite reliable in the field, also in the greenhouse under more severe conditions of infection. With cerenox only 10% emergence was obtained regardless of the origin and virulence of the fungus. Cerenox and germisan were ineffective against highly aggressive *Pythium* [loc. cit.] on beet; even with weaker strs. these 2 preparations were not always reliable, but peas have been reliably protected by cerenox.

Seeds from 7 sources showed different susceptibility to *Pythium* and *Pleospora*. The virulence of the latter was diminished, but the susceptibility to the former was not altered by seed storage for 18 months. At 5–7° C. *Pythium* infections decreased and those by *Pleospora* increased compared with those at 12°. Infection of sugar beet by both fungi occurred almost exclusively before emergence and then susceptibility to infection through the roots ceased. This resistance to the highly aggressive *Pythium* may be delayed by up to 7 days. An infection in the 1st leaf stage was possible only under artificial conditions through the vegetative cone. Peas were susceptible for a short time only, but to a higher degree. In sterilized soil the high virulence of *Pythium* and *Pleospora* decreased with the addition of 5 fungi (*Aspergillus niger*, 4 *Penicillium* spp.) and with an aerogenic colonization with micro-organisms. According to the results of the field and greenhouse experiments *Pleospora betae* must be considered as the decisive agent of root rot.

SCHAREN (A. L.). **Germination of oospores of Aphanomyces euteiches embedded in plant debris.**—*Phytopathology*, **50**, 4, pp. 274–277, 6 fig., 1960.

In further studies at Neb. agric. Exp. Sta., Lincoln [cf. **38**, 465], oospores of *A. euteiches* in plant debris from infested soils were germinated in horse-dung infusion

and pea-sand leachate as used by Smoot *et al.* [**37**, 503]. Plant debris particles were also placed in 7-in. lengths of cellulose tubing which had been boiled to remove glycerine. These were folded so that the 2 open ends were left ¼ in. above the soil surface when the tubing was firmly embedded among the roots of growing plants. The percentage germination after 7 days of oospores adjacent to pea, bean, maize, or soybean roots in sand, or in sand, sterile soil, or unsterilized soil alone was 40, 33, 34, 33, 24, 16, and 8, respectively, and in unsterilized soil adjacent to the same roots it was 26, 20, 16, and 19. Germinating oospores produced sporangia and zoospores and single zoospore isolates were shown to complete the life cycle in culture and to be pathogenic to pea plants, different isolates varying in pathogenicity. The data indicate that oospores are the primary inocula for new outbreaks of root rot of pea, zoospores being the primary infective agent.

Reiling (T. P.), King (T. H.), & Fields (R. W.). **Soil indexing for Pea root rot and the effect of root rot on yield.**—*Phytopathology*, **50**, 4, pp. 287–290, 1 fig., 5 graphs, 1960.

At Univ. Minn. Inst. Agric., St. Paul, Wasatch and New Line Early Perfection peas were grown in 1955–57 in pots in soil from fields known to be infested with *Aphanomyces euteiches* [see above] and *Fusarium solani* f. *pisi* [cf. **38**, 345]. The plants were removed at full bloom and the amount of root rot recorded. Subsequent estimates of the amount of root rot developing in the fields sampled agreed closely with the greenhouse data. In fields rated as having light, moderate, and severe infection losses were 9·6, 22·3, and 33·1%. Vine and pod yield decreased in relation to the degree of root rot, early vars. such as Alaska proving more resistant (max. pod and vine wt. decrease 54 and 35%, respectively) than late vars. such as Canner King and Cascade (losses up to 63 and 65%).

Carter (M. V.) & Moller (W. J.). **Black spot of Peas.**—*J. Dep. Agric. S. Aust.*, **63**, 8, pp. 353-355, 363, 1 fig., 1960.

Of the fungi responsible for this disease, *Ascochyta pisi*, *A. pinodella*, and *Mycosphaerella pinodes* [**35**, 64; **38**, 288], the last is the most widespread and destructive because of its efficient spore dispersal and rapid development under favourable conditions. Heavy spore discharge was recorded with an automatic spore trap within a few min. of starting sprinkler irrigation in an infected field. The min. moisture for spore discharge was equivalent to 0·007 in. rain. Discharges from wet debris in the field persisted for long periods in cool weather. Appreciable numbers of spores were caught in the air above a commercially grown crop 2 hr. after irrigation ceased. High summer temp. is unlikely to cause much reduction in the carry-over of the spores in infected crop residues on the soil surface.

Very large numbers of *M.* spores were discharged in the laboratory from infected straw kept at $< 176°$ F. for 1½ hr. and at 149° neither spore discharge nor viability was impaired.

Marras (F.). **Intorno alla septoriosi del Pisello causata de Septoria pisi West.** [On septoriosis of Pea caused by *S. pisi*.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 324–328, 1 pl., 1960. [Engl. summ.]

A brief account is given of the symptoms, causal organism, and possible control of pea blight (*S. pisi*) [cf. **18**, 413; **34**, 437], not definitely recorded in Italy before, but a serious outbreak of which occurred in Sardinia in 1959.

Klement (Z.). **The occurrence of organisms causing the bacterial diseases of Bean in Hungary.**—*Acta microbiol. Acad. Sci. hung.*, **6**, 3, pp. 191–196, 1959.

This information has already been noticed [**39**, 363].

Tuite (J.). **The natural occurrence of Tobacco ringspot virus.**—*Phytopathology*, **50**, 4, pp. 296–298, 1960.

In further studies at Purdue Univ., Lafayette, Ind. [cf. **39**, 363], 454 plants of 37 spp. from an area adjoining a field of soybeans severely affected by bud blight [cf. **25**, 484] were tested serologically and by host reaction on Bountiful bean (*Phaseolus vulgaris*), cowpea, tobacco, and soybean. Tobacco ring spot virus was found in 6 spp. that were symptomless, and also with symptoms in *Melilotus* spp. and red clover. The virus proved to be 9–36% seed-borne in dandelion.

Vörös (J.) & Molnár (A.). **Peronospora manshurica (Naumoff) Sydoff, a Szója új kórokozója Magyarországon.** [*P. manshurica*, a new disease of Soybean in Hungary.]—*Növénytermelés*, **7**, 4, pp. 371–374, 1959. [Abs. from *Hung. agric. Rev.*, **8**, 4, p. 10, 1959.]

The occurrence of *P. manshurica* on soybean [map 268], especially on the var. 'Bitter Kopf', is reported for the 1st time from Hungary.

Lukashevich (A. I.). Особливості паразитизму збудника аскохітозу Нуту та їх роль у нагромадженні інфекції. [Peculiarities of the parasitism of the causal agent of ascochytosis of Chick Pea, and their role in the accumulation of infection.]—*Rep. Acad. Sci. Ukr., 1958*, 7, pp. 788–792, 4 fig., 1958. [Russ., Engl. summ.]

From research at the All-Union sci. Res. Inst. for Maize it was found that *Ascochyta rabiei* [**37**, 627], normally a parasite on chick pea [*Cicer arietinum*], develops also as a saprophyte on the death of the host. Seed infection may increase 1·5–2-fold when harvesting on the Ukrainian steppe is late or where plants have been stacked in ricks for a long time before threshing in rainy weather. By the following spring post-harvest detritus left on the fields is also heavily infected.

Coley-Smith (J. R.). **Studies of the biology of Sclerotium cepivorum Berk. IV. Germination of sclerotia.**—*Ann. appl. Biol.*, **48**, 1, pp. 8–18, 1 pl., 2 fig., 1960.

In further work at Univ. Birmingham [cf. **39**, 205] sclerotia from pure cultures of *S. cepivorum* 6 weeks old germinated immediately in soil after abrasion of the rinds; sclerotia not abraded became capable of germination after burial in soil for a month or more. Marked stimulation of germination occurred in the presence of onion, leek, and shallot plants. Little, if any, germination took place in soil only or in the presence of the non-host plants barley, cabbage, carrot, and white clover. Germination was observed in soils of widely different pH (being greatest at the highest) and over a wide range of soil water content. On uninjured onion roots germination was greatest near the tip; on those experimentally injured it was increased, but the effect of position was lost. Germination was independent of contact between roots and sclerotia and was induced by root extracts of all *Allium* spp. tested but of no other plants. Apparently under field conditions germination is induced by a thermostable chemical substance from *Allium* roots. The process of germination is described in detail.

Stalder (L.) & Niklaus (L.). **Neuere Ergebnisse bei der Bekämpfung des Zwiebelmehltaues.** [Recent results in the control of Onion mildew.]—Reprinted from *Gemüsebau, 1960*, 6, 3 pp., 1960. [Engl. summ.]

In comparative experiments in 1959 in localities selected by the Eidgenössische Versuchsanstalt für Obst-, Wein- und Gartenbau, Wädenswil, Switzerland, the degree of control of *Peronospora destructor* by spraying with 0·2% zineb+0·1% wetter was superior to that by Cu-oxychloride or Cu-S [cf. **39**, 524]. Moreover, unlike the Cu compounds, zineb does not cause leaf scorch. The use of a mist

sprayer necessitates a 5–6-fold higher dosage of zineb than the standard, but no wetter is required. Control measures are particularly important in early attacks (before July).

Condon (Patricia) & Kuc (J.). **Isolation of a fungitoxic compound from Carrot root tissue inoculated with Ceratocystis fimbriata.**—*Phytopathology*, **50**, 4, pp. 267–270, 1960.

A more detailed account from Purdue Univ., Lafayette, Ind., of information already noted [**39**, 141].

Burkholder (W. H.). **A bacterial brown rot of Parsnip roots.**—*Phytopathology*, **50**, 4, pp. 280–282, 1 fig., 1960.

This rot, observed on Long Island in 1959 at the spring harvesting of parsnips overwintered in the field, was investigated at Cornell Univ., Ithaca, N.Y. Dark brown and rather firm, it often involved much of the upper half of the root, and caused up to 50% loss of crop. The causal organism, which is fully described, is apparently new and has been named *Pseudomonas pastinacea* Burkholder; its opt. temp. is 18° C. It also rotted inoculated potato tubers and head lettuce, but not carrots, onions, or radish.

Marshall (Gillian M.). **The incidence of certain seed-borne diseases in commercial seed samples. III. Septoria leaf spot, or blight, of Celery.**—*Ann. appl. Biol.*, **48**, 1, pp. 27–33, 1960.

In tests of commercial celery seeds at the Official Seed Testing Sta., Cambridge, from 1926–58, the percentage of those with under 1% infection by *Septoria apii-graveolentis* [cf. **34**, 516] and *S. apii* [cf. **32**, 533] increased from 6·1% in 1926–31 to 46·2% in 1953–58, while the percentage of heavily infected samples declined. Samples submitted since 1949 for purity and germination tests only, however, were more heavily infected, only 26·3% having under 1% infection in 1953–58. In 1957–8 of all celery samples tested 78·8% were infected by *Septoria* spp.; 6 of 30 samples were found to carry viable *Septoria* spores. No difference was noted in the percentage germination of infected and healthy seeds.

Schnathorst (W. C.). **Effects of temperature and moisture stress on the Lettuce powdery mildew fungus.**—*Phytopathology*, **50**, 4, pp. 304–308, 4 graphs, 1960.

Further studies at Univ. Calif., Davis [cf. **39**, 207], showed that the percentage germination of conidia of *Erysiphe cichoracearum* was greater on detached leaves than on glass slides and best at 18° C. The min. temp. for infection and growth on lettuce was 6–10° and the max. approx. 27°. Some 3% of the conidia still proved viable after 158 hr. at −5°. Over the 1st 24 hr. germination was most rapid between 18° and 25°; subsequently the percentage increased at lower temps. The moisture stress opt. for germination was between 0·45 and 1·65 mm. vapour pressure deficit (VPD) [cf. **34**, 428] (95·6–98·2% R.H. between 25 and 30°), though some germination took place at 25 mm. VPD (0·1% R.H. at 25°). Max. humidity (0 mm. VPD, 100% R.H.) inhibited germination. Though temp. is the main factor in disease development, atmospheric moisture influences its rapidity and severity.

Elenkov (E.). Гъстотата на засаждането и болестите по Пипера и Патладжана. [Density of planting and diseases of Sweet Pepper and Eggplant.]—Градинарство [*Gradinarstvo*], **2**, 4, pp. 9–11, 1960.

Relations between the density of planting and *Verticillium* wilt and stolbur [virus] incidence were studied at the Inst. 'Maritsa', Plovdiv, Bulgaria. At a constant width between the rows (60 cm.) seedlings of pepper [*Capsicum* sp.] var. Kalinkov

planted singly, 30 cm. apart, in soil infested with *V. alboatrum* [**39**, 143] developed 79·2% wilt and yielded 1,327 kg. dekar, while those planted in pairs 20 cm. apart suffered 28·75% wilt and bore 2,793 kg./dekar. Similarly the more resistant var. Pazardzhishka kapiya, single at 20 cm., suffered 32·79% wilt (yield 1,988 kg./dekar) and paired at 25 cm. 10·34% wilt (yield 2,459 kg. dekar). Results relating to stolbur infection were analogous, viz. 47·5% (2,674 kg./dekar) at 20 cm. single and 20·4% (3,544 kg. dekar) at 10 cm. in the var. Sivriya, and 60·12% (1,632 kg./dekar) at 20 cm. single and 24·48% (2,634 kg. dekar) at 10 cm. with Pazardzhishka kapiya. Wilting of eggplant at the lowest and the highest density tested occurred in 40·95% and 20·03%, respectively, a difference corresponding to 56·8% difference in yield; stolbur [cf. **38**, 248] incidence resulting from different density of planting showed a still wider range.

Flock (R. A.), Laird (E. F.), & Dickson (R. C.). **Curly top in field Melons.**—*Calif. Agric.*, **14**, 2, pp. 9, 15, 2 fig., 1960.

In 1958 the melon crop failed in the Imperial and Palo Verde regions of the Colorado desert: there was widespread crown blight [**37**, 198], and some of the plants exhibited the extreme stunting characteristic of beet curly top virus infection [cf. **28**, 267; and below] though most grew beyond the stunting stage to set a few fruits. Curly top seriously injures melon plants if it attacks before the 6-leaf stage, but after this it does not prevent reasonable growth.

In the absence of natural infection in 1959 the Entom. Dept, Univ. Calif., Riverside, made artificial infection trials which showed that the yield from early infected plants was 7% and from late infected 44% of the normal, and that late infected plants bore about 70% as many melons as healthy, though these packed at 45 crate, compared with 36 from the healthy plants. The experimentally infected plants showed stunting and grey-green discoloration, death of crown leaves, sparse set, small fruit, poor netting, elongated fruit, low sugar content, and early ripening. Beet curly top infection would seem to be contributory to the condition of crown blight.

Flock (R. A.), Laird (E. F.), & Dickson (R. C.). **Loss caused by late infection of Cantaloupes by the curly top virus.** *Phytopathology*, **50**, 4, pp. 327–328, 1960.

An inoculation experiment by Univ. Calif. Citrus Exp. Sta., Riverside, with *Circulifer tenellus* carrying [beet] curly top virus resulted in 349 crates of cantaloupes acre from uninoculated control plants, 154 from those inoculated on 15 Apr. 1959, and 23 from those on 23 Mar., indicating that later infection, though not as serious as early, can still cause considerable losses, and may contribute to the crown blight syndrome [**37**, 198].

Elenkov (E.) & Khristova (Ekaterina). Борбата с някои болести и неприятели по парниковите Краставици. [Control of some diseases and pests of hothouse Cucumbers.] –Градинарство [*Gradinarstvo*], **2**, 3, pp. 24–27, 1960.

This survey by the Inst. 'Maritsa', Plovdiv, Bulgaria, notes, *inter alia*, control of powdery mildew [*Erysiphe cichoracearum*: **39**, 146] with sprays and by sprinkling (approx. 2–3 l./sq. m.) of 0·5–0·6% Ba solutions or karathane at 80–100 g./100 l.; of gummosis [*Cladosporium cucumerinum*: **39**, 12] with bulbozan dusting at 7–10 days' intervals; and of leaf scorch [? *Corynespora cassiicola*: **32**, 342] with 0·2–0·25% dithane or aspor sprays at 10–15 days, or 7–8 days if symptoms are visible.

Raymond (F. L.), Etchells (J. L.), Bell (T. A.), & Masley (P. M.). **Filamentous fungi from blossoms, ovaries, and fruit of pickling Cucumbers.**—*Mycologia*, **51** (*1959*), 4, pp. 492–511, 6 fig., 1 map, 1960. [31 ref.]

After referring to work on the softening of commercially brined cucumbers the

writers describe studies since 1952 at the Forest Biol. Lab., Maple, Ontario, and the U.S. Food Fermentation Lab. and N. Carol. State Coll., Raleigh, on the isolation, classification, and frequency of the filamentous fungi collected during 1 season from 5 commercial fields, a greenhouse, and a commercial brining station in N. Carol. Of 1,032 isolates, 964 (93·4%) were reduced to 73 spp. in 34 gen. (the remainder were not fully identified); 31 spp. in 5 major gen. represented 80·5% of all isolations, while 42 spp. in 29 minor gen. accounted for 12·9%. Seven spp. in the 5 major gen. *Penicillium*, *Ascochyta*, *Fusarium*, *Cladosporium*, and *Alternaria* represented 71·4% of all isolations, viz. *P. oxalicum* (15·7%), *Ascochyta cucumis* (15·4%), *F. roseum* (10·3%), *C. cladosporioides* (10·1%), *Alternaria tenuis* (8·5%), *F. oxysporum* (5·8%), and *F. solani* (5·6%). These comprised most of the total fungus populations of field blossoms and station blossoms collected throughout the season and were considered to be an important source of pectinolytic and cellulolytic enzymes.

Moustafa (A. M.). **Nutrition and the development of mushroom flavor in Agaricus campestris mycelium.**—*Appl. Microbiol.*, **8**, 1, pp. 63–67, 1960. [18 ref.]

At the Special Products Lab., Res. Dept, Red Star Yeast & Products Co., Wis., max. flavour and aroma were produced on the 5th day in mycelium of *A. campestris* grown in submerged culture [**34**, 762] on medium containing a trace of yeast extract solids and malt syrup or malt sprouts maintained at pH 5·4. The sugar and N content of the medium was 2% and 133 mg./flask respectively.

Report on the Third International Conference on Seed Pathology sponsored by the International Seed-Testing Association.—27 pp., ISTA-PDC 104, Beirut, Lebanon, 1960. [Fr., Germ. summ. Cyclostyled.]

At this conference, held 8–14 Feb. 1960 [cf. **38**, 444], a summary was presented of results of a series of comparative seed-health tests of maize and rice begun in 1959 and conducted at 24 stations in 20 countries, in general using 3 standard methods (blotter, potato dextrose agar, and sand). For the detection of *Gibberella fujikuroi* and *Aspergillus* spp. on maize the blotter method was found slightly preferable to agar plating. Only exceptionally did colonies of *Piricularia oryzae* develop on potato dextrose agar; according to a subsequent report from Lisbon, decorticated rice meal agar may be more suitable. The blotter method was also found suitable for detecting *Helminthosporium oryzae* [*Cochliobolus miyabeanus*] and *P. oryzae*. Checking the acidity of media with indicator papers and a pH of 6·5–6·7 were recommended. A temp. of about 28° C. was considered the most suitable for testing seeds from subtropical and tropical areas. The conference stressed the need for distribution maps of major seed-borne pathogens with an indication of the frequency and severity of each. In the immediate future comparative seed-health testing should be concentrated on wheat, rice, maize, barley, and pea.

Annual Report, East Malling Research Station, 1959 (1st Oct. 1958–30th Sept. 1959)—xxvi+144 pp., 32 fig., 39 graphs, 3 maps, 1960.

Some of the information in this report [cf. **38**, 561] has already been noticed. In the Plant Pathology Section (pp. 23–29) Laxton's Superb pear is stated to be less resistant to inoculation of shoots, fruits, blossoms, or branches with *Erwinia amylovora* [**39**, 596] than Williams Bon Chrétien or Conference. Spartan, Macintosh, Winesap, and Cox's Orange apple vars. were infected via the blossom with pear strs.; Cox's Orange Pippin was the most resistant. Pear isolates proved pathogenic on *Crataegus*, *Amelanchier*, *Chaenomeles*, *Cotoneaster*, *Cydonia*, *Pyracantha*, and *Sorbus*. Cultural studies indicated no major difference between English and N. American strs. Bacteriophages active against *E. amylovora* and *Pseudomonas syringae*, isolated from soils, were found to be specific for the genera, but not for the individual spp.

Seven protective applications of lime-sulphur (2 pre-, 1 during, and 4 post-blossom) to Cox's Orange Pippin on M. IX were as effective in controlling scab (*Venturia inaequalis*) as a curative programme (3 pre-, 1 during, and 5 post-blossom applications) of lime-sulphur or phenyl mercury chloride (pre-blossom only) within 7 days of infection periods.

Further work on a DNOC petroleum spray at bud swell against *Podosphaera leucotricha* on apple [**38**, 607] indicated that both components are necessary for max. effect and that the spray is more effective at bud swell than during dormancy. Microscope studies indicated that it does not eradicate the fungus, but limits its spread in infected tissues during bud break.

A devastating epidemic of bud rotting in a commercial hazel [*Corylus avellana*] plantation was attributed to a fungus closely allied to *Gloeosporium* [cf. **36**, 128], which is under study.

Traps designed to catch water-borne spores [cf. **38**, 70] indicated that the numbers of spores of *G. album* [**39**, 116] in an experimental orchard were low during the summer and increased in autumn: spore counts obtained by washing monthly collections of stubs followed a similar pattern. A parallel study of the relationship of *G. album* spore production to periods of natural fruit infection is in progress. *G. album* and *Neofabraea perennans* were induced to sporulate abundantly *in vitro* by a modification of Borecki's technique [**38**, 561]. A single Sept. pre-harvest spray of Cu oxychloride in cotton seed oil or of captan checked *Gloeosporium* rots in storage better than cinnamic acid.

Further anatomical studies to elucidate the mechanism of resistance to *Verticillium* spp. in wilt-tolerant hops [**37**, 673] and in a series of crop plants and weeds indicated various levels of resistance. Suberin, apparently an important factor in endodermal resistance, is present in the hypoderm of many plants, e.g. *Solanum nigrum*, in which it appears to contribute substantially to *V.* resistance. Results suggest that extreme differences between species in wilt resistance, but not intra-specific variations, may be associated with differences of phenolic content. Certain known plant phenolics (those of the hop have not yet been identified) and their analogues proved inhibitory to *V. in vitro* at high, but stimulatory at very low concs. There is apparently relatively little direct connexion between the woody tissues of the current year and those of the previous year, new growth being supplied with water via new wood laid down in the roots and main stock in the same year. This suggests that *V.* in the wood vessels of any year would not have ready access to the new vascular tissue formed in the following year, and in fact field plants with symptoms in one year may not show them in the next. Annual variations of wilt severity in tolerant vars. suggest that such severity results from environmental factors rather than pathogenic variations in the fungus. Hop shoots rooted under mist have been successfully used, with the aid of supplementary heat and light during winter, for the rapid differentiation of progressive and fluctuating strs. of *V. alboatrum* by conidial inoculations. In a glass-house the spread of the fungus was compared in bare soil and in soils planted with susceptible and resistant plants, under conditions precluding conidial spread. Mycelial spread seems to occur only through the root systems of susceptible hosts such as tomato. Three different types of mycelial inoculum survived equally for at least 14 weeks in unsterile soils, and a preliminary experiment indicated conidial survival of up to 5 weeks in unsterilized soil. In the field some *V.* persisted under grass cover and clean cultivation after 3 yr., but probably soil survival is best under annual weeds. When the tolerant 1147 was planted immediately after grubbing Fuggles with progressive wilt, wilt incidence in Fuggle N indicators interplanted annually remained at approx. 60% for 3 yr. Symptom expression on the tolerant var. over this period varied considerably.

In a tolerance trial initiated in 1958 *V. alboatrum* has proved more pathogenic

to 6 strawberry vars. than *V. dahliae*, the sp. normally responsible for strawberry wilt in the field. Talisman was highly resistant.

A field trial now concluded indicated that, given a constant dosage/acre, variations of droplet size or spray pattern of lime-sulphur did not substantially affect the control of apple scab and mildew. On pears dilute hydraulic sprays were more effective than concentrates against scab [*V. pirina*] on Williams Bon Chrétien, and captan was better than S, especially on Doyenne du Comice. As a systemic fungicide sodium cinnamate was at least as effective at 0·02% as at 0·2% in inhibiting scab when sprayed after infection of Cox apple shoots under glass. There was little evidence of systemic activity with Na salts of cinnamic or *o*-coumaric acid in similar experiments in the field with M III rootstocks. The virus causing stem pitting on certain crab apple vars. was found in several American apple vars. [cf. **39**, 178].

Two soil-borne viruses were transmitted from orchard cherry trees infected by cherry rasp leaf diseases to herbaceous hosts by sap inoculation [cf. **39**, 601]. Raspberry ring spot [raspberry Scottish leaf curl] virus was associated with some outbreaks of rasp leaf, and arabis mosaic virus [cf. **39**, 603] with others. A virus producing symptoms resembling 'plum pox' [cf **39**, 29 *et passim*] has been graft-transmitted to Warwickshire Drooper plum, the first confirmation of the virus nature of the disease in Britain, though symptoms have been observed in orchards for several yr.

A virus complex on strawberry causing symptoms similar to those attributed to soil-borne viruses was shown to be transmitted by strawberry aphids [*Pentatrichopus fragaefolii*]. The complex of at least 2 viruses produced crinkle-like symptoms on vars. tolerant of the crinkle virus, but further work is needed to establish the relationship, if any, of the 'new' viruses to those previously known to infect strawberry. A virus producing symptoms [on strawberry] similar to those of stolbur disease was transmitted by naturally infected specimens of *Thamnotettix dilutior*.

The search for the vector of hop nettlehead virus [**38**, 561] continues: 2 hop test plants became infected after being infested with Cercopid hoppers collected from the vicinity of a persistent nettlehead outbreak. No evidence of soil transmission was obtained.

Among the Bulletins for Fruit Growers is one by R. V. Harris giving the annual summary of 'Progress in research on *Verticillium* wilt and virus diseases of hops in 1959' (pp. 132–134).

5e Jaarverslag Proefstation voor de Groenteteelt in de Volle Grond in Nederland 1959. [Fifth annual report of the Experiment Station for Outdoor Vegetable Culture in the Netherlands, 1959.]—103 pp., 14 fig., 5 diag., 1 graph, 1960.

The following information, *inter alia*, is contained in the sections on plant breeding (pp. 39–49), varietal selection (pp. 68–82), and plant diseases (pp. 83–96) [cf. **38**, 449]. In 2 field tests by H. J. Poerink the percentages of 'margins' in various selections of white cabbage vars. Vroege Witte, Vroege Herfstwitte, Late Herfstwitte, and Groep Succeswitte were 26, 58, 54, and 12, respectively, i.e. an av. of 65% of the incidence in 1958. The av. percentage of the disorder in stored cabbage during 1958-9 ranged from 6 to 37. As in the previous year, the incidence of 'margins' in Vroege and Late Herfstwitte rose with wide spacing between the plants (67×75 and 80×90 as against 50×60 cm.) and increased N (240 and 320 kg./ha.), especially in the former var., although the tendency was less pronounced, presumably because of the drought.

Further confirmation was obtained in soil profile tests by J. M. M. Van Bakel, involving up to 12 borings at 5-m. intervals, of the connexion between a thick,

hard layer and a high incidence of asparagus foot rot (*Fusarium* [*culmorum* and *F. oxysporum*]) coupled with low production. Captan, zineb (both at 0·5%), and 1% Cu oxychloride (especially the last-named) reduced the incidence of *Phytophthora porri* in leeks [**38**, 556], but soil disinfection with formalin (15 l./50 l. water/are) proved ineffectual.

A massive invasion of [unspecified] aphids occurred at the end of the season, and all early potato selections were tested by J. Betzema for resistance to leaf roll virus with reasonably satisfactory results, only 6% of the total contracting infection except in the progeny of crosses designed to incorporate frost resistance, of which 70% were attacked. Encouraging progress was also made in the development of combined resistance to *P.* [*infestans*] and nematode infestation, 81% of the progeny of such crosses reacting as planned to one or both pathogens.

T. Buishand & Miss G. Breebaart continued their researches on the development of combined resistance in beans (*Phaseolus vulgaris*) to *Colletotrichum* [*lindemuthianum*] and the viruses of roll and severe mosaic [strs. of common and bean yellow mosaic, respectively], and top necrosis. In greenhouse trials under adverse weather conditions the highest number of survivals in the F_2 occurred in (*P. vulgaris* × *P. dumosus*) × Double White Stringless or × Aromata, Mechelse Sabel × Emergo, and Combine × Emergo with 542 out of a total of 1,029 plants (53%), 104 out of 200 (52), and 482 out of 587 (57%), respectively. In the field virus incidence was exceptionally heavy owing to the dry, warm weather, and many selections resistant to the fungus were infected.

IX Международная Конференция по Карантину и Защите Растений от Вредителей и Болезней. [Ninth International Conference on Quarantine and the Protection of Plants from Pests and Diseases], Moscow, 12–22 Aug. 1958. [Engl. & Russ. Received Jan. 1960.]

Among the numerous contributions from the Soviet delegation at this conference [cf. **39**, 51, 458] I. A. Churaev presented a paper 'On the state and further progress in plant quarantine work in the U.S.S.R.' (12 pp.), in the course of which attention was drawn to the wide dissemination of *Synchytrium endobioticum* [**39**, 438] in the western U.S.S.R., the disease being common in the Ukraine, as well as in White Russia, Lithuania, and Latvia. Interceptions included *Neovissia horrida* [on rice: map 75] (1605) and *N. indica* [on wheat: map 173] (4). K. E. Kalashnikov & I. D. Shapiro reported on 'Control measures against pests and diseases in maize crops' (14 pp.) and the wide use of Hg preparations for maize seed treatment. These are especially effective against *Fusarium* wilt [cf. **38**, 365; **39**, 168]. Extensive researches have been made in the last 4 yr. in new districts for maize cultivation (Siberia, the Urals, the central part of the non-chernozem zone, and in the Baltic Republics), to discover more effective methods for treating maize seed. The most effective results have been obtained with granosan and with 50% thiram [**39**, 23]. Captan and arigon did not prove satisfactory in the U.S.S.R. In 'Methods of forecasting the occurrence of pests and diseases of agricultural crops' (19 pp.) I. Y. Polyakov notes that in the Altai region the spring wheat vars. Smena and Caesium III are periodically affected by *Ustilago tritici* [*U. nuda*: **38**, 591]. The occurrence of the disease in the following yr. is largely dependent on the conditions in which the seeds are grown, as well as on the vegetative condition of the plant and the correlation between temp. and rainfall at heading. A similar dependence has been established for *Helminthosporium* spp. [**38**, 510]. Methods are also being perfected for long-term forecasting of outbreaks of brown rust [*Puccinia recondita*: **39**, 97] and yellow rust [*P. striiformis*: **38**, 732] on winter wheat in the Krasnodar area. The dependence of the causal agents on atmospheric temp. and rainfall in the preceding months is being used as a basis for this work. The time for spraying vines against *Plasmopara viticola* [cf. **39**, 530] is based on the usual postulate that

the incubation period is 4 days with temp. 22–25° C., 5 days with 19–21°, 6–7 days with 12–21°, 8–9 days with 15–16°, and up to 15 days with 11–12°.

In an outline of the latest measures for quarantine and plant protection in the U.S.S.R. (11 pp.), concerned mostly with pests, V. V. Kosov notes that the most widespread diseases are loose smut (*Ustilago tritici*) [*U. nuda*] and rust (*Puccinia triticina*) [*P. recondita*] on wheat, apple scab (*Venturia inaequalis*), mildew (*Plasmopara viticola*) and 'oidium' [*Uncinula necator*] on vine [**35**, 907], cotton disease (*Bacterium* [*Xanthomonas*] *malvacearum*) [**39**, 25], and [beet] leaf spot (*Cercospora beticola*) [**38**, 47].

A paper 'On the system and character of measures of disease and pest control and their influence on biocenosis' (15 pp.) by J. M. Polyakov refers, *inter alia*, to the development of resistance to fungicides by fungi. The resistance of *P. viticola* to Bordeaux mixture may increase fourfold after 10 yr. spraying and the efficiency of chemicals against *U. nuda* is similarly reduced. Further investigation of the nature and extent of this phenomenon is desirable.

Săvulescu (T.) et al. **Starea fitosanitară în Republica Populară Romînă în anii 1955–1956 și 1956–1957.** [Phytosanitary situation in the Romanian People's Republic in the years 1955–6 and 1956–7.]—*Met. Inst. Cerc. Agron. Român.*, N.S. **31**, 197 pp., 14 fig., 1959. [Russ. translation pp. 91–181. Fr. summ.]

This report [cf. **37**, 514] is in 2 sections, one (pp. 6–29) dealing with weather conditions and one with physiological and parasitic diseases of cereals (pp. 30–43), fodders (44–51), industrial plants (51–59), vegetables (59–65), medicinal herbs (65–67), vine (68–73), fruit trees and bushes (73–82), and ornamentals (83–89). New records for the country included *Sclerotinia trifoliorum* on clover [map 274] in 1956, *Septoria salviae* var. *sclareae* on sage (*Salvia sclarea*) in 1957, *Phyllosticta chaenomelina* on *Chaenomeles japonica*, *Ascochyta majalis* on lily-of-the-valley, and *A. hydrangeae* on hydrangea.

Plant disease survey for the twelve months ending 30th June 1959. Twenty-ninth Annual Report N.S.W. Department of Agriculture. Biological Branch—Division of Science Services.—54 pp., 1 map, [? 1959. Mimeographed.]

This report [cf. **38**, 563; **39**, 72] contains a number of new records for N.S.W. The epidemic of stem rust (*Puccinia graminis* f. sp. *tritici*) which spread through the whole of E. Australia in 1958 was largely caused by race 21–2, which seriously affected Gabo and related wheats. The only commercial vars. expected to show resistance are Festival, Spica, Warigo, Glenwari, and, for the present, Eureka. A sap-transmissible streak mosaic, the 3rd virus disease of wheat [cf. **37**, 326] detected in N.S.W. since 1956, was found, but is of little importance. Black cob rot (*Helminthosporium carbonum*) of maize was recorded for the 1st time in the State near Taree. Of 420 tons of sugarcane lost from disease individual losses were estimated to be caused by red rot (*Glomerella tucumanensis*), 260 tons; by chlorotic streak virus, 100 tons; by leaf scald (*Xanthomonas albilineans*), 50 tons; and by Fiji disease virus, 10 tons. Ratoon stunting virus was observed, but losses not estimated.

Sooty blotch (*Polythrincium* [*Cymadothea*] *trifolii*) was again reported on crimson clover. Bacterial blight (*Xanthomonas malvacearum*) of cotton [map 57], apparently new for N.S.W., was prevalent in the experimental area on Narrabri Exp. Farm, where cotton wilt (*Verticillium dahliae*) [map 366] is also recorded for the 1st time. Anthracnose (*Colletotrichum trifolii*) on lucerne was recorded from several localities, while rust (*Uromyces striatus*) on *Medicago glutinosa* and *C. trifolii* on *M. arabica* were new host records.

Blue mould (*Peronospora tabacina*) is estimated to have been directly responsible

for the loss of ⅓ of the total tobacco crop and, indirectly, of a further 10% by inhibiting suckering after hail damage.

Florida gummosis [**30**, 608], a suspected virus, caused slight to moderately severe blistering on most of several hundred Calamondin yearling trees on trifoliate stock in a nursery in July, 1958. Previous observations indicate that the onset of blistering follows a condition of stress brought on by drought, heat, heavy fertilizer applications, etc. Several cases of woody gall virus [**39**, 576] were found on garden trees of seedling rough lemon.

Apple green crinkle virus [**35**, 878] and apple ring spot virus were observed, both confined to Granny Smith.

A mosaic type leaf pattern of virus origin on almond was reported and symptoms are described on Goldmine nectarines resembling those of peach rosette mosaic virus on that host. Peach mosaic virus was detected for the 1st time in N.S.W. in 1-yr.-old peach trees.

The number of banana plants infected by bunchy top virus declined from 4,268 in 1956–7 to 2,700 in the yr. under review, though the total acreage increased from 27,774 to 29,659. Oil applied for *Cercospora* leaf spot [*Mycosphaerella musicola*] control had no significant effect on populations of the bunchy top vector (*Pentalonia nigronervosa*). The possibility of leaf speckle on banana being caused by *Sphaerella* [*Mycosphaerella*] *musae* [cf. **39**, 372] is under investigation. A considerable number of bananas were discarded during the winter of 1958 because of the development of lenticular cracks and extensive cork on the skin of mature fruit, possibly induced by dry soil conditions or a nutrient deficiency. Wilt (*Fusarium oxysporum* f. *passiflorae*) of passion fruit, which is increasing in importance on the central coast, caused heavy losses.

Vine leaf spot (*Pseudocercospora vitis*) is reported to have caused severe post-harvest injury at Kyogle. Visible symptom development of [vine] leaf roll virus in Hunter River Riesling varied from nil to 100% in the Griffith area, M.I.A., during Mar. and Apr. 1959. Losses due to bunch stem die-back of vine, the cause of which is unknown, ranged from a trace to over 60%, all in Black Muscat vars., and were heaviest in vineyards on red, basalt-derived soils. Peacock spot (*Cycloconium oleaginum*) of olives was reported for the 1st time in the M.I.A.

Among diseases on ornamentals white rust (*Albugo tragopogonis*) was recorded for the 1st time in N.S.W. on *Gerbera jamesonii*.

A rot caused by *Sclerotinia sclerotiorum* on Brussels sprouts was a 1st record for N.S.W. Big vein (undetermined) was seen in several lettuce plantings; all big vein plants examined had resting sporangia of *Olpidium brassicae* in their roots [cf. **37**, 620 *et passim*].

Plant diseases new for N.S.W. included mat disease (*Myceliophthora lutea*) of mushroom [cf. **28**, 268]; root rot (*Phytophthora* sp.) of peas from a crop of the var. William Massey; *Alternaria brassicae* on *Sisymbrium orientale* and turnip; *Diplodia phyllodiorum* on *Acacia pycnantha*; *Alternaria brassicicola* on swede; *Peronospora parasitica* on Brussels sprouts; *Sclerotinia sclerotiorum* on *Cleome speciosa*; *Guignardia citricarpa* on *Dendrobium speciosum* and *Monstera deliciosa*; *Colletotrichum gloeosporioides* on avocado pear; wood rot (*Fomes setulosus*) of plum; crown rot (*Phytophthora parasitica*) of rhubarb; *Helminthosporium turcicum* and *Puccinia purpurea* on *Sorghum alumni*; and *H. sativum* [*Cochliobolus sativus*] on Sudan grass.

Annual Report, Cawthron Institute, Nelson, New Zealand, 1958–59. –44 pp., 1959.

Investigations on bitter pit of apples summarized (pp. 25–26) in this report [cf. **38**, 654] have already been noticed [**39**, 476]. Further nutritional studies of *Phytophthora cactorum* are reported by T. B. C. Christie (pp. 27–28). The opt. conc. of $CaNO_3$ is 1·9 g./1,000 ml., growth being uniform over the range 15–90 g./1,000 ml. dextrose.

COLEMAN (P. G.). **Annual Report of the Department of Agriculture, Federation of Malaya, for the year 1958.**—ix+98 pp., 7 pl., 1959.

A field test against *Curvularia* oil palm seedling blight [**38**, 761] with 4 fungicides, noted in brief (p. 38) in this report [cf. **38**, 658], proved captan to be best, giving good control. A severe and widespread attack of *Marasmius palmivorus* [**37**, 8], which causes rotting of oil palm fruit brunches, occurred on a Selangor estate (p. 39), as well as an obscure disease causing the outer fronds to wither and die followed by the death of the bud.

A disease of young coconuts, of which no previous record exists, has been noted (p. 40) in the Bagan Datoh area of Perak. A root rot, which later extends into the base of the stem, causes extensive discoloration and disintegration of the tissues. Premature withering of the outer fronds ultimately extends to the inner fronds and the palm dies. One fungus consistently isolated has been provisionally identified as *Cylindrocladium scoparium*.

The conclusion of tests with mealy bugs and grafting to determine if a virus is responsible for die-back of cacao indicated that this was not so (p. 46). Complete flooding of the soil with water for 2 months before planting tomatoes is reported (p. 47) to be successful to a certain degree against wilt [*Pseudomonas solanacearum*: **36**, 457]. Grafting tomatoes on to resistant eggplant rootstocks was successful in preliminary pot trials but unions failed in the field [cf. **36**, 360].

Among new records (p. 50) are leaf spot (*Curvularia trifolii*) on *Gladiolus* sp., rust (*Uromyces leptodermus*) and sooty mould (*Meliola panici*) on leaves of *Panicum nodosum*, leaf spot (*Mycosphaerella* sp.) on *Rauwolfia serpentina*, and *M. rosicola* [cf. **19**, 348] on roses.

Annual Report, Department of Agriculture, Kenya, 1958. Vol. II.—167 pp., 1960. Sh. 7/50.

Some of the information given, especially on coffee, has been noticed [cf. **39**, 105]. The acting senior plant pathologist, R. A. ROBINSON, reports (pp. 18–24) [cf. **38**, 449] a high proportion of sterile heads in the long rains rice crop at the Mwea/Tabere Irrigation Scheme, probably due to excessively cold irrigation water and air temps. Bacterial wilt (*Pseudomonas solanacearum*) of potatoes, though not the most serious disease, is likely to prove the most difficult plant pathological problem in Kenya. *Pyrenophora tritici-repentis* and *Septoria nodorum*, generally of little account, damaged wheat, and *Helminthosporium sativum* [*Cochliobolus sativus*], *H.* [*P.*] *teres*, and *Rhynchosporium secalis*, the latter predominant over 8,000 ft., caused severe leaf diseases of barley; *H. gramineum* was entirely absent. On maize *Sphacelotheca reiliana* was exceptionally damaging and *H. turcicum* troublesome.

Mycosphaerella brassicicola continued to damage Brussels sprouts on the S. Kinangop. *Peronospora destructor* was more severe than usual on onions, and both *Pseudoperonospora cubensis* and *Erysiphe cichoracearum* continued seriously to hamper cultivation of cucurbits; only karathane controlled the latter on cucumbers. *Alternaria dauci* seriously infected a few carrot crops and *Sclerotinia sclerotiorum* caused moderately severe damage to lettuce. *Uromyces phaseolorum* may prevent the cultivation of Michigan Pea dwarf beans [*Phaseolus vulgaris*]. *Synchytrium dolichi* [cf. **27**, 158] caused losses of cowpeas in S. Province. Among diseases of ornamentals *U. gladioli* and *Botrytis gladiolorum* on gladiolus were probably the most important economically. *Cochliobolus* sp., possibly new, caused much damage to Rhodes grass (*Chloris gayana*); there seem to be varietal differences in susceptibility. Bunt (*Tilletia echinosperma*) [cf. **34**, 436] again reduced the yields of *Setaria sphacelata*.

New records for Kenya included *Puccinia hordei* on barley, *Peronospora viciae* [cf. **36**, 380, 519], *Mycosphaerella pinodes*, and *Septoria pisi* [cf. **34**, 437] on peas, *Puccinia pelargonii-zonalis* [cf. **32**, 669] and *S. geranii* on *Pelargonium* sp., *Cur-*

vularia trifolii on white clover, *Puccinia penniseti* on eggplant [the alternate host], *Periconia lateralis*, *P. digitata* [cf. **35**, 165], and *Periconiella echinochloae* on *Panicum maximum*, *Colletotrichum circinans* on onion, *C. truncatum* and *Ascochyta phaseolorum* on *Phaseolus lunatus*, *Leptosphaeria michotii* [imperfect state, *Coniothyrium* sp.] on sugarcane, *Plasmopara halstedii* on *Cineraria grandiflora*, *Didymosphaeria panici* and *Cercospora sorghi* [map 338] on *Pennisetum purpureum*, *C. canescens* on cowpea, and *Dendryphiella interseminata* on passion fruit.

In the report of the senior plant breeder (pp. 47–56) H. C. THORPE states that there were 7 physiologic races of wheat stem rust (*Puccinia graminis*) prevalent during the season, K 12, 13, 14, 16, 17, 18, and 19; a new one, K 20, is suspected. *P. triticina* [*P. recondita*] was widespread and very damaging. *P. glumarum* [*P. striiformis*] was little in evidence, but *Septoria nodorum* caused injury. Selection for resistance to *Helminthosporium turcicum* and *P. sorghi* is now a routine in the maize breeding programme. In a zineb spray trial against these 2 diseases the sprayed plants yielded 23·3 bags acre and had a blight score of 1 and a rust score of 0·5 (on a scale 0–5), compared with 17·7 bags and 2 and 1, respectively, for the unsprayed.

In the report of the plant pathologist, Plant Breeding Sta., Njoro (pp. 57–58), E. J. GUTHRIE states that races 11 and 15 of wheat stem rust (*P. graminis*) were not found in 1958. No one race was markedly dominant. Race 16 was the commonest, but by a smaller margin than in 1957; races 12 and 14 showed a marked revival.

Annual Report of the Department of Agriculture of the Northern Region of Nigeria, 1955–56.—161 pp., [? 1959].

In the plant pathology section (pp. 78–84) [cf. **37**, 327] ELIZABETH HARRISON reports the following leaf diseases of guinea corn (sorghum) identified so far: grey leaf spot (*Cercospora sorghi*), anthracnose (*Colletotrichum graminicola*), rust (*Puccinia purpurea*), dead lesions of sooty streak (*Ramulispora sorghi*), zonate leaf spot (*Gloeocercospora sorghi*), leaf blight (*Helminthosporium turcicum*), downy mildew (*Sclerospora sorghi*), and *Ascochyta sorghina*, with *Eudarluca australis* parasitizing the rust uredosori. In inoculation tests, which are being continued, *A. sorghina* produced pycnidia and spores. Also identified were 5 *Curvularia* spp. found on blighted sorghum heads, *Tolyposporium ehrenbergii* [cf. **39**, 469], and *Sphacelia sorghi*, the last a new record for Nigeria. Ergot sclerotia of *S.* sp. [cf. **37**, 202] were found in millet seed (*Pennisetum typhoideum*) from Samaru, where the disease was 1st noticed in 1954. It is hoped that flotation in brine (sp. gr. ca. 1·1) will prove successful in removing these from the seed.

In a series of inoculations of sugarcane vars. with *Colletotrichum falcatum* [*Glomerella tucumanensis*] the following were most resistant: POJ 2725, CO 543, CO 281, and CO 413. An unidentified bud rot of date palm [cf. **39**, 486] occurred in Kano Province. The malady of groundnuts, known as 'blindnuts', with symptoms ranging from apparently healthy kernels with internal discoloration to completely undeveloped kernels, is reported by R. E. WILSON. Because of the effect of fertilizers, application of which reduces the condition, it is considered that 'blindnuts' are primarily a manifestation of nutrient status and that the accompanying bacterial infection is secondary.

Annual Report of the Department of Agriculture, Ghana, for the year 1956–57. 84 pp., 6 pl., 1 map, 1959. 11*s*. 6*d*.

Some of the information detailed under Plant Pathology (pp. 22–23) in this report [cf. **37**, 515] has been noticed [**37**, 463; **38**, 326]. In trials in the Aburi area spraying cacao pods with 0·3% perenox, both with and without agral, gave yield increases of 35–55% in numbers of pods, though black pods (*Phytophthora palmivora*) fell by only 20% [cf. **38**, 735]. Statistical analysis of the 1954–56 black pod control

extension trials has shown that low-volume applications of perenox increased pod yields by 20–55%, while black pods decreased by only 3–10%. In particular, perenox treatment decreased the incidence of *P. palmivora* on cherelles.

Rust (*Hemileia vastatrix*) was present on coffee in the Eastern Region and Ashanti as well as Togoland, and leaf spot (*Cercospora coffeicola*) appeared to be common in some nurseries.

In a fertilizer trial at Kwadaso the attack of *Fomes* sp. [cf. **36**, 308] on cassava tubers was significantly greater on plots which had received mulch regularly over the past 8 yr. A survey of leaf spot on 10 groundnut vars. at Kwadaso indicated that *Cercospora* [*Mycosphaerella*] *arachidicola* infects the plant fairly early on, while *C. personata* [*M. berkeleyi*], the cause of most damage in Ashanti, appears later.

Ali (S. B.). **Major diseases of economic plants in Pakistan.**—*Tech. Docum. F.A.O. Plant Prot. Comm. S.E. Asia & Pacific* 3, 4 pp., 1959. [Cyclostyled.]

The 2nd edition of this list, from the Dept of Plant Protection, Karachi, covers 33 hosts or host families.

Pucci (E.). **Rassegna dei principali casi fitopatologici osservati in Tripolitania. I° contributo : nel 1959.** [Review of the principal phytopathological records noted in Tripolitania. 1st contribution: in 1959.]—*Riv. Agric. subtrop.*, **54**, 1–3, pp. 34–53, 9 fig., 1960. [Engl. summ.]

This annotated list of fungi received at the phytopathological Lab. of the Nazirat of Agric., Sidi el-Mesri, Tripoli, during 1959, includes *Pseudomonas savastanoi* [map 135] on olive branches, *Plasmopara viticola* [221] on vine, *Venturia inaequalis* [120] on apple leaves and fruit, *V. pirina* [367] on pear (fruits, almost exclusively), *Tranzschelia pruni-spinosae* [223] on leaves of peach and other hosts, *Armillariella* [*Armillaria*] *mellea* [143], causing root rot of orange, *Puccinia glumarum* [*P. striiformis*: 97] on wheat and other hosts, *Ustilago avenae* [238] on oats, *P. sorghi* [279] and *U. maydis* [93] on maize, *Pseudopeziza medicaginis* [129] on lucerne, *Bremia lactucae* [86] on lettuce, *Marssonina panattoniana* [82] on endive, *Colletotrichum lagenarium* [313] on cucumber, *Uromyces appendiculatus* [290] and *C. lindemuthianum* [177] on bean [*Phaseolus vulgaris*], *Ascochyta pisi* [273] on pea, *U. fabae* [200] on broad bean, *Cercospora* [*Mycosphaerella*] *arachidicola* [166] and *C. personata* [*M. berkeleyii*: 152] on groundnut, *Phytophthora infestans* [109] on potato, *Alternaria solani* [89] on potato and tomato, *Septoria lycopersici* [108] on tomato, *Leveillula taurica* [217] on capsicum and other hosts, *U. betae* [265] and *C. beticola* [96] on sugar beet, and *Agrobacterium tumefaciens* [137] on rose roots.

Umbreit (W. W.) (Editor). **Advances in applied microbiology. Vol. 2**—xii + 384 pp., New York and London, Academic Press, 1960. $12.

This volume, on the same lines as its predecessor [**3**, 212], includes useful reviews on 'Aerosol samplers' by H. W. Batchelor (pp. 31–64), 'A commentary on microbiological assaying' by F. Kavanagh (pp. 65–93), 'Application of membrane filters' by R. Ehrlich (pp. 95–112), and 'Air sterilization' by A. E. Humphrey (pp. 302–311).

Compendium of plant diseases.—264 pp., 125 col. fig., Philadelphia, Pa, Rohm & Haas Co., 1959.

This useful compendium, published to commemorate 50 years' service to agriculture by Rohm & Haas Co., gives a succinct account in popular terms of the symptoms, geographical distribution, economic importance, and control of the chief diseases of vegetables, fruits and nuts, field crops, and speciality crops (cacao, coffee, hops, rubber, tea, and tobacco) caused by fungi, viruses, bacteria, and nematodes. Specific chemical control agents are not named, only general control

measures being suggested. Each page of text is accompanied by an attractive illustration in colour. The material has been obtained largely from published works and personal communications from individual workers.

KOTTE (W.). **Leitfaden des Pflanzenschutzes im Obst- und Gemüsebau.** [Manual of plant protection in fruit and vegetable growing.]—136 pp., 116 fig., Berlin, Paul Parey, 1960. DM. 9.80.

This 'small guide over a large subject' is intended to serve primarily as a quick reference book for horticulturists and amateur gardeners, on whose experience it is largely based. There are 4 sections, viz. an introductory account of the nature of infection and infestation; control (by cultivation, by mechanical, biological, and chemical means, and by the use of apparatus); and notes on diseases and pests of fruit; and of vegetables, with popular and scientific names, arranged under hosts. The publication is well produced and effectively illustrated.

SKERMAN (V. B. D.). **A guide to the identification of the genera of bacteria.**—ix + 217 pp., 31 pl., 5 fig., Baltimore, Md, Williams and Wilkins Co., 1959. 44*s*.

This well-illustrated manual contains a key to the generic determination of the bacteria, a digest of the genera based on data given in the 7th edition of Bergey's Manual [**37**, 516] and on original papers, and a chapt. on methods. The excellent illustrations show the morphological characters used in the key; many are original photomicrographs from slide cultures prepared according to the author's method. The chapt. on methods includes descriptions of isolation and diagnostic media, staining techniques, and physiological and biochemical procedures for the systematic examination of bacteria. For autotrophic bacteria recipes for a complete new series of alternative media with a common synthetic base have been provided, in addition to the original methods. Attention is drawn to the inadequacy of present descriptions, including those of the plant pathogens.

SODA (J. A.) & CLEVERDON (R. C.). **Some serological studies of the genera Corynebacterium, Flavobacterium, and Xanthomonas.** *Leeuwenhoek J. Microbiol. Serol.*, **26**, 1, pp. 98–102, 1960.

Agglutination tests at Univ. Conn., Storrs, revealed low cross reactivity and high titre in *X.* (7 spp.) [cf. **39**, 81] and low cross reactivity in *C.* (5), which helped to differentiate the spp. Cross reactions among *F.* (7 spp.) were numerous and of relatively high titre; 3 spp. with similar antigenic components failed to be diagnosed serologically. Cross-agglutination studies indicated that the organisms form 3 groups which follow generic lines.

DESAI (M. V.) & SHAH (H. M.). **Bacterial leaf spot disease of Desmodium rotundifolium DC.**—*Curr. Sci.*, **29**, 2, pp. 65–66, 1 fig., 1960.

Symptoms observed at the Inst. Agric., Anand, India, were watersoaked spots with a yellow halo, first on the lower surface, pinhead-size, then on the upper surface, with a pale brown centre, later irregular and dark brown, the spots eventually coalescing and involving most of the leaf. The causal bacterium failed to infect a number of other Leguminosae, including *D. gangeticum* and *D. diffusum* [cf. **28**, 577], and is proposed as a new form *Xanthomonas desmodii-rotundifolii* [*X. desmodii* f. *rotundifolii*].

GRAHAM (D. C.) & DOWSON (W. J.). **The coliform bacteria associated with Potato black-leg and other soft rots. I. Their pathogenicity in relation to temperature. II. Biochemical characteristics of low- and high-temperature strains.**—*Ann. appl. Biol.*, **48**, 1, pp. 51–57, 1 pl.; pp. 58–64, 1960. [32 ref.]

In investigations at Dept Agric. Scotland and Univ. Cambridge 12 glasshouse trials

with 25 isolates of coliform soft-rot bacteria from various countries demonstrated that all caused typical potato black leg at 76° F. or over, some producing the disease at temps. under 66°. The high-temp. group originated mainly from tropical and sub-tropical areas or from plants grown in heated glass-houses, whereas the low-temp. bacteria were confined to north temperate regions. The former comprised *Erwinia carotovora*, *E. chrysanthemi*, and *E. aroideae*, and the latter *E. atroseptica* [cf. **37**, 262] only; but the results indicate that all coliform soft-rot bacteria are variants of *E. carotovora*.

This temp. relation provides a possible means of discovering the origin of black leg in certain tropical and sub-tropical crops grown from imported Scottish 'seed'. For example, the organisms obtained from Israel and S. Rhodesia belonged to the low-temp. group, a result which gives further support to the view that the black-leg organism is carried with the tuber to the importing country and the disease there need not be due to an indigenous str.

In the 2nd paper the biochemical characteristics of the 25 isolates are recorded. The low-temp. strs. are distinguished from the high-temp. isolates by their production of gas, rapid fermentation of lactose and maltose, their methyl red and Voges-Proskauer reactions, and their failure to give a + indole test.

Because of delayed lactose fermentation the bacterium causing chrysanthemum blight, one causing a slow wilt of carnation, one isolated from guayule (*Parthenium* sp.), and one inducing a leaf rot of *Philodendron* [**36**, 808] formerly classified as *E. chrysanthemi* or as a f.sp. of *E. carotovora* are considered to be a new var. The diagnosis of the coliform soft-rot bacteria should, it is considered, be based on qualitative and quantitative biochemical reactions rather than on host range.

Friedman (B. A.) & Jaffe (M. J.). **Effect of soft rot bacteria and pectolytic enzymes on electrical conductance of witloof Chicory tissue.**—*Phytopathology*, **50**, 4, pp. 272–274, 2 graphs, 1960.

At the Market Path. Lab., U.S. Dept Agric., N.Y., the electrical conductance of witloof chicory leaves, measured by means of a low-frequency alternating current of 1 kc/sec. [cf. **38**, 170], was increased by inoculation with living cells or culture filtrates of *Pseudomonas* sp. and *Erwinia* sp. The effect was more marked with *E.* sp., which also caused more soft rot. Increased conductance was detected before symptoms developed and in advance of the margin of visible lesions. The fact that a non-pectolytic str. of *P. marginalis* caused neither soft rot nor conductance changes suggests that tissue injury is due to pectolytic enzymes.

Rouatt (J. W.) & Katznelson (H.). **Influence of light on bacterial flora of roots.**—*Nature, Lond.*, **186**, 4725, pp. 659–660, 1960.

At Canada Dept Agric., Ottawa, wheat plants grown in normal light for 2 weeks and afterwards in light reduced from 1,000 to 300 foot-candles for 3 weeks showed a notable decrease of root surface bacteria both by plate count and the number of methylene blue reducers, and also of glucose fermenters and ammonifiers. This seems to indicate qualitative and quantitative changes of root excretions which normally stimulate the rhizosphere microflora.

Riegert (A.). **La tumeur crown gall. Aspects actuels de la croissance tumorale chez les végétaux.** [The crown gall tumour. Current aspects of tumour growth in plants.]—*Biol. méd.*, **47**, 1, pp. 1–11, 1958. [49 ref.]

A critical study of recent research, culminating in the differentiation of the tumour-inducing principles residing in (*a*) *Agrobacterium tumefaciens* and (*b*) the host cells, followed by a review of arguments in favour of the hypothesis that the latter is identical with the graft tumour-inducing principle.

Ark (P. A.) & Thompson (J. P.). **Experimental greenhouse control of crown gall and Olive knot with antibiotic drenches.**—*Plant Dis. Reptr*, **44**, 3, pp. 197–199, 1960.

In further experiments [**39**, 458] at Univ. Calif., Berkeley, antibiotic drenches consisting of streptomycin [**27**, 276], terramycin, or a combination of both in an isoamyl-kerosene-lanoline-vaseline mixture were tested against crown gall (*Agrobacterium tumefaciens*) on apricot and peach and against olive knot (*Pseudomonas savastanoi*). The drenches, applied with a paint-brush, killed the galls within 4–7 days in a warm greenhouse.

Samšiňáková (Mme A.) & Čermáková (Mme A.). **Vliv infekce houby Beauveria bassiana (Bals.-Criv.) Vuill. na larvy Mandelinky bramborové Leptinotarsa decemlineata Say.** [Effect of infection by the fungus *B. bassiana* on the larvae of the Colorado Beetle, *L. decemlineata*.]—*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 163–168, 1 graph, 1960. [Russ., Germ., Engl. summ.]

Larvae were infected at the Biol. Inst. and Res. Inst. for Plant Protection, Czechoslovak Acad. Sci., [Prague], by *B. bassiana* [cf. **37**, 639] applied as either a spore suspension (7 million cu. cm.) or pure spore dust. At av. temp. 20° C. the larvae began to blacken on the 3rd or 4th day after inoculation, losing gradually the ability to move and adhere to the leaves, and all died by the 11th day. Heavier inoculation accelerated the disease.

Telenga (Mme M. A.), Dyadechko (M. P.), & Sikura (Mme A. I.). Використання гриба білої мускардини в боротьбі з колорадським жуком. [The use of the white muscardine fungus in the control of the Colorado beetle.] Допов. Укр. Акад. сіл.-гос. Наук [*Dopov. Ukr. Akad. sil.-hos. Nauk*], **2**, 5, pp. 27–29, 1959. [Russ. summ.]

Results are reported from the Ukrainian sci. res. Inst. for Plant Protection of the use of a biopreparation of *B. bassiana* [cf. **32**, 253] with DDT against the Colorado beetle [*Leptinotarsa decemlineata*: cf. above]. The work was done in 1958 in the Transcarpathian region. The biopreparation was obtained by propagating *B. bassiana* on maize seed, followed by milling, and used at 4 kg./ha. with DDT at 1·2, 0·6, and 0·3 kg. active substance ha. The best kill of larvae (96–100% destruction) was given by 30% DDT (0·6 kg. ha.)—the biopreparation which also destroyed 68% of 2nd generation adult beetles entering the soil for overwintering; combined with BHC the preparation killed 65·4% pupae and larvae by contact.

Shekhurina (Mme T. A.). **Melanospora parasitica Tul.** как паразит гриба **Beauvaria bassiana (Bals.) Vuill.** в Ставропольском крае. [*M. parasitica* as a parasite of the fungus *B. bassiana* in the Stavropol' area.]—*Bot. Zh. S.S.S.R.*, **45**, 4, pp. 606–608, 3 fig., 1960.

From the All-Union sci. res. Inst. Plant Protection, Leningrad, the author reports that *M. parasitica* [cf. **31**, 116] was first found on the 'noxious little tortoise' [*Eurygaster integriceps*] infected by *B. bassiana* [cf. above] in metal isolators in the autumn 1956 in local forests. In 1957–8 it was again found in isolators and also in compressed forest litter, i.e. in places where high humidity is retained for a long time.

Buchli (H.). **Une nouvelle espèce de champignon parasite du genre Antennopsis Heim sur les Termites de Madagascar.** [A new species of parasitic fungus of the genus *A.* on Termites of Madagascar.]—*C. R. Acad. Sci., Paris*, **250**, 20, pp. 3365–3367, 1960.

In Feb. 1960 the author received from Madagascar a case of dead wood, collected

60 km. E. of Tananarive, in which were the termites *Neotermes amplus*, *N. desneuxi*, and *Glyptotermes longiceps*. All the colonies were parasitized by a fungus differing in various features from *A. gallica* [**39**, 377] and herein designated *A. grassei* Buchli [without a Latin diagnosis]. In the latter some of the haustorial capsules serving to fix these fungi to the insect consist of 3 instead of 4 cells; 3 cells fairly often give rise to 3 conidiophores; and conidiophores may be produced by the 2 central cells only. *A. grassei* also occurs on the eggs and young larvae of all 3 spp. of termites, which appear, however, to sustain no damage, the conidial heads being free from the colourless mucilage secreted by *A. gallica*. The heads are quite distinct in the 2 spp., those of *A. grassei* being unpigmented and relatively thin-walled, with cells generally equal in height and width in contrast to the broad, flattened ones of *A. gallica*.

In connexion with the receipt in Feb. 1960 of a specimen of *A. gallica* on *Calotermes flavicollis* from Dubrovnik, Yugoslavia, the author discusses the remarkable geographical distribution of the genus.

Davis (E. F.), Tuma (Barbara L.), & Lee (Lucy C.). **Handbook of toxicology. Vol. V. Fungicides.**—242 pp., W. B. Saunders Co., Philadelphia and London, 1959. 38*s*. 6*d*. [326 ref.]

In this volume, edited by Dorothy S. Dittmer, 196 compounds which either destroy or inhibit growth and reproduction of fungi are listed alphabetically, generally according to the nomenclature of *Chem. Abstr.* Included for each fungicide are alternative names, molecular and structural formulae, physical and chemical properties, details of tests, toxicities to man and animals, and use. Appendices give the patent numbers of the compounds in different countries and an additional list of compounds having fungicidal properties, accompanied by relevant reference to the numbered bibliography.

Report of the FAO panel of experts on the use of pesticides in agriculture.—Rome, FAO Meeting Report No. 1959/3, 20 pp., 1959. [Cyclostyled.]

The panel met in Rome 6–13 Apr. 1959 to discuss the role and the safe and efficient use of pesticides, potential risks, public relations concerning them, and the legislative control of pesticide residues. Conclusions and recommendations appear on pp. 18–20.

Official FDA tolerances.—*Nat. agric. chem. Ass. News*, **18**, 3, pp. 2–19, 1960.

The annual list of the pesticide tolerances laid down by the Food and Drug Administration, U.S.A., up to 1 Feb. 1960 [cf. **38**, 453].

Agricultural chemicals for aerial spraying.—*Agric. Aviat.*, **2**, 2, pp. 55–64, 1960.

A reference list from the European agric. Aviation Centre, The Hague, of pesticides, herbicides, and fungicides in alphabetical order of proprietary names, with percentage of active ingredient, nature of the applied product (liquid, emulsion, etc.), and numerical ref. to an appended list of European chemical manufacturers.

Specialpræparater anerkendte af Statens Forsøgsvirksomhed i Plantekultur til bekæmpelse af plantesygdomme og skadedyr. Gyldig for året 1960. [Special preparations approved by the State Experimental Service in Plant Cultivation for the control of plant diseases and pests. Valid for the year 1960.]—*Tidsskr. Planteavl*, **63**, 5, pp. 812–836, 1960.

A comprehensive list, prepared on the usual lines [cf. **38**, 662], of plant protectives officially authorized for use in Denmark during the current year.

Schnicker (J. L.). **Kemikalickontrollen i finansåret 1958–59.** [Inspection of chemicals in the financial year 1958–9.]—*Tidsskr. Planteavl*, **63**, 5, pp. 898–910, 1960.

As usual, a section of this report [cf. **38**, 662] is concerned with plant protectives for application in agriculture and horticulture.

De Bruyckere (R. C. C.). **De chemische bestrijding van planteziekten en onkruid in Zeeuwsch-Vlaanderen.** [The chemical control of plant diseases and weeds in Zeeuwsch-Vlaanderen.]—*Landbouwvoorlichting*, **16**, 12, pp. 695–702, 1959.

Among the principal pathogens to be combated in this province of the Netherlands is beet yellows virus [**36**, 565], which in 1957 was responsible for a loss of 500–800 gulden ha. in parts of the western region where the aphid vectors [chiefly *Myzus persicae*] were not controlled. In 1959 an area of 6 ha. was sprayed twice. Other important pathogens include *Phytophthora* [*infestans*] on potato and anthracnose [*Colletotrichum lindemuthianum*] and halo blight [*Pseudomonas phaseolicola*] of bean [*Phaseolus vulgaris*: **36**, 296]. An informative account is given of the various methods of propaganda and publicity employed, the use of communal spraying equipment, and other points of interest [cf. **39**, 546].

Whittaker (E. C.) & Henry (P.). **Concentrate spraying in New South Wales.**—*Agric. Gaz. N.S.W.*, **70**, 12, pp. 631–637, 5 fig., 1959.

This general account from the N.S.W. Dept Agric. of efficient spraying of orchards notes that when spraying dry trees the drip point is reached when more than 75–80 gal./acre are applied. The min. figure is determined by the type of machine used and may be as low as 5 or 6 gal. acre. Droplet size should range from 30–100 μ. Disks should be checked at intervals as under certain conditions appreciable wear is possible after 100 hr., causing the orifices to enlarge. The extremely small and numerous droplets in concentrate spraying guard against run-off. If a constant vol. acre is required when spraying trees of various row spacings speed of travel should be varied accordingly, e.g. 18 ft. spacing, 1·75 m.p.h., 24 ft. spacing, 1·25 m.p.h. At these speeds and with an output of 2·5 gal./min. approx. 1½ acres would be covered 125 gal. vat, giving a coverage of about 80 gal./acre. It is now preferred procedure to calculate materials required/vat on a rate/acre basis, e.g. for pre-blossom twice the quantities of oils, fungicides, and insecticides/100 gal. dilute spray; for post-blossom 2½ times the quantities of fungicide/100 gal., thus enabling the requirement/vat to be determined, viz. amount of material/acre × acreage covered/vat according to the speed travelled.

Somers (E.). **Physical aspects of the efficiency of sprays.**—*N.A.A.S. quart. Rev.* 46, pp. 68–75, 1959. [36 ref.]

A brief, authoritative review from Long Ashton Res. Sta., Bristol, covering the properties of the spray deposit; spray impaction; spray retention; coverage and distribution; and the tenacity of the spray deposit. It is concluded that the key to improved efficiency in spraying lies in more knowledge of the opt. type and min. levels of deposit for control of specific diseases.

Stellmach (G.). **Zur Methodik des Wirkungsvergleiches von dispersen Fungiziden.** [On the technique of the comparison of efficiency of disperse fungicides.]—*Chem.-Ing.-Tech.*, **31**, 11, pp. 731–734, 1 fig., 1 diag., 1959.

At the Institut für Pflanzenpathologie und Pflanzenschutz, Univ. Gottingen, Germany, adsorptively stabilized fungicides are separated by means of fractionated sedimentation (gravitational) into particle size fractions [cf. **30**, 380] and assayed for fungitoxicity and for rain- and irrigation-fastness. Methods are also described which enable the particle size spectrum of a given preparation to be precisely

defined and maintained unaltered through a series of experimental formulations with a high degree of reliability.

YATES (W. E.) & ASHTON (F. M.). **The logarithmic sprayer for chemical screening plots.**—Abs. in *Agric. Engng*, **41**, 1, p. 51, 1960.

Pointing out (in a paper presented at the Annual Meeting of the American Soc. Agric. Engineers, June 1959) that research scientists in agricultural-chemical industries, governmental agencies, universities, and extension services are annually evaluating the biological effects of thousands of agricultural chemicals, the authors discuss the general design criteria, critical components, construction, calibration, and operation of a simple, complete, 'light-weight', logarithmic dosage sprayer, in which the chemical conc. decreases logarithmically with the distance travelled. Experimental values were obtained which closely followed the theoretical relationships derived in respect of conc., flow rate, spray time, distance travelled, speed, 'half-life', and 'half-distance'.

DUNIN (M. S.). Приспособительная изменчивость (адаптация) фитопатогенных грибов под воздействием фунгицидов. [Adaptive variability (adaptation) of phytopathogenic fungi under the action of fungicides.] —*Proc. Timiryazev agric. Acad., 1959*, 48, pp. 79–92, 1959. [29 ref.]

In tolerance tests at this Academy in Moscow the mycelium of *Venturia inaequalis* subcultured 1–4 times on media with varying $CuSO_4$ content showed increasing adaptability, manifest in a progressively earlier germination and more rapid growth. The tolerance of higher concs. was built up gradually, so that the growth of a colony up to 21·4% diam. of the control on the medium with 0·2% $CuSO_4$ was followed by the growth of its subculture up to 29·6% on $CuSO_4$ at 0·25%; 0·34 and 0·36%, which entirely prevented growth of unadapted mycelium, were able to reduce it only to 14·6 and 9·4% diam. of the control, respectively, in a mycelium cultured previously on 0·2, 0·28, and 0·32% $CuSO_4$. Subcultures from toxic media grown on normal media regained normal intensity of growth and sporulation, though usually not after the 1st transfer. The adaptability to the fungicide, especially at higher concs., was accompanied by compact growth of the aerial and a darker colouring of the immersed mycelium, curving and branching of the hyphae, and irregular size and form of the cells. *Glomerella cingulata* and *Xanthomonas phaseoli* grown with Bordeaux mixture, Cu acetate, and thiram gave similar results. The interchange of the media with different fungicides suggested a mutual build-up of tolerance between the Cu compounds, with no effect on the tolerance of thiram. It is therefore advisable to use unrelated chemicals in combination or in rotation, and to avoid the use of sub-lethal doses which will progressively lose their efficiency [cf. **38**, 453].

CIFERRI (R.) & SCARDAVI (A.). **Velocità di scomparsa dello zineb dalle foglie di varie piante.** [The rate of disappearance of zineb from the leaves of various plants.] —*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 129–137, 3 graphs, 1960. [Engl. summ.]

It was demonstrated that there was no significant difference in the wt. of zineb on glass plates and on vine, apple, and lettuce leaves of equivalent size, dried between sheets of blotting-paper, even after 16 days at 20° and 30° C., the same wt. of zineb having been placed on each initially; at 40°, however, the wt. on all fell by 31–44% in 16 days. The av. loss of zineb from leaves still attached to the living plant was about 44% at 20° and 68% at 30°, though the figure varied with the species. On the glass plates no decomposition of zineb occurred at 20° or 30°. It is concluded that the loss of zineb from treated foliage is related chiefly to some product secreted or excreted by the leaves.

Ferrero (P.) & Gillet (A.). **New class of organic fungicides.**—*Industr. chim. belge, 1959, Suppl.* 2, pp. 713–717. 1959. [*Chem. Abstr.*, **54**, 7, col. 7042 h, 1960.]

Halogen-N derivatives of naphthalene were shown to possess highly fungicidal properties in tests on *Botrytis cinerea*, *Dothichiza populea*, *Nectria galligena*, *Fusarium* sp., *Alternaria solani*, and *Phytophthora infestans*. The principal compounds assayed were 1-chloro-2-4-dinitronaphthalene, 1-chloro-2,4,5-trinitronaphthalene, 1-chloro-2,4-dinitro-7-methylnaphthalene, and the tetra- and hexachloro-2,4-dinitronaphthalenes. In laboratory tests the 1st-named was more toxic to *A. tenuis* than a number of standard fungicides, and in the field it increased yields of potato and vine over dithiocarbamate and Cu preparations.

Fehérvári (G.). **Organic arsenic compounds as fungicides in plant protection.**—*Nehezvegy. Kutató Int. Közl.*, **1**, pp. 307–308, 1959. [*Chem. Abstr.*, **54**, 7, col. 7042 f, 1960.]

At the Heavy chem. Industry Res. Inst., Veszprém, Hungary, phenarsazine Cl (adamsite) prevented the growth of *Alternaria tenuis* spores in a 0·7 mg./l. suspension. Toxicity and undesirable side effects on plants, e.g. leaf scorch, were reduced by substituting the Cl^- by organic radicals such as phthalic imide. Ph_2AS and $(ClCH{:}CH)_2AsCl$ gave comparable results. The application of these compounds is economical: they can replace toxic Hg fungicides in current use.

Sidhu (G. S.), Sattur (P. B.), & Hasan (Salma J.). **Synthesis and fungicidal activity of some arylnitroalkenes.** *J. sci. industr. Res.*, **19** c, 2, pp. 38–39, 1960.

At the Regional Res. Lab., Hyderabad, 2-iodo-3-methoxy- and 2-nitro-4-methyl-β-nitrostyrenes at 1 : 100,000 inhibited the growth of *Aspergillus niger*.

Torgeson (D. C.), Lambrech (J. A.), & Hensley (W. H.). **Fungicidal effectiveness of S,S′-dimethyl xanthogenethylenebis [dithiocarbamate] and related compounds.**—*Contr. Boyce Thompson Inst.*, **20**, 5, pp. 299–305, 1960.

A series of these compounds was screened for inhibition of spore germination of *Alternaria oleracea* [*A. brassicicola*] and *Monilinia* [*Sclerotinia*] *fructicola* (by a test-tube dilution method, the ED_{50} ranges being given an alphabetical rating [cf. **23**, 36; **26**, 497]), and for the protection of tomato plants against inoculation with *A. solani* and *Phytophthora infestans* (5-fold dilution series; ED_{95} values determined by interpolation from the curve obtained when the percentage disease control data were plotted on logarithmic probability paper). The methyl, ethyl, isopropyl, and butyl homologues were about equally fungitoxic, but toxicity was reduced when the alkyl group was increased to cyclohexyl or 2-ethylhexyl, and when the alkylene group was increased above ethylene. In field tests S,S′-dimethyl xanthogenethylenebis (dithiocarbamate) was as effective as zineb against *P. infestans*.

Mässing (W.). **Über Cuprothioglykolsäure-Fungizide.** [Concerning the fungicide copper thioglycollate.]—*Anz. Schädlingsk.*, **32**, pp. 155–156, 1959.

Copper thioglycollate, a mercaptide which can be produced as a dust or wettable powder, is very persistent as it is practically insoluble in water. In a field trial against *Phytophthora infestans* on potato at 1·35 kg. Cu/ha. it gave a yield of 367 kg./ha. compared with 324·8 kg. for commercial Cu oxychloride at 2·94 kg. Cu (control, 301·6 kg.). Spore germination tests with *Venturia inaequalis*, *Phoma betae*, and *Alternaria* sp. indicated that the Na salt ($CuSCH_2$–COONa), behaving as a true colloid in water, is much more active than either Cu thioglycollate or Cu oxychloride. When sprayed in a suitable formulation the Na salt soon coagulates on the plants and is then firmly adherent and insoluble. It is also active against

Erysiphe polygoni, *E. graminis*, and certain bacteria. Both these fungicides have low toxicity for mammals.

Richardson (L. T.) & Miller (D. M.). **Fungitoxicity of chlorinated hydrocarbon insecticides in relation to water solubility and vapor pressure.**—*Canad. J. Bot.*, **38**, 2, pp. 163–175, 1 pl., 1 fig., 5 graphs, 1960. [13 ref.]

At the Pesticide Res. Inst., Canada Dept Agric., Ont., the fungitoxicity (inhibition of mycelial growth) of 8 chlorinated hydrocarbon insecticides [cf. **39**, 521] was determined by culture plate bio-assay with *Rhizoctonia* [*Corticium*] *solani*. The bimodal, rather than linear, dosage-response curves obtained were shown to be correlated with the water solubility and vapour pressure of the compounds. The initial rise of each curve to a peak, due to supersaturation, falls as normal saturation is regained; the conc. of toxicant vapour on the organism governs the 2nd rise in the curve in accordance with the vapour pressure of the compound. Lindane, highly water soluble, was highly fungitoxic, and so were heptachlor, chlordane, and aldrin, which possess high vapour pressure. DDT, methoxychlor, dieldrin, and endrin were weakly fungitoxic because of low water solubility and low vapour pressure.

Kulikov (A. I.), Kurlina (Mme I. P.), Polyakov (I. M.), & Shipinov (N. A.). Новый инсектофунгицидный и гербицидный препарат — нитрафен. [Nitraphene—a new insectofungicide and herbicide preparation.]—*J. agric. Sci., Moscow*, **5**, 2, pp. 123–124, 1960. [Engl., Germ., Fr. summ.]

Nitraphene (preparation No. 125 in the experimental stage [**35**, 864]), used at the All-Union Inst. for Plant Protection for spraying vines in association with subsequent treatment with 1% Bordeaux mixture in 1955, reduced mildew [*Plasmopara viticola*: cf. **39**, 150] at harvest from 10·2 to 1%, disease incidence from 0·3 to 0·08%, and raised yield to 22·2 centners/ha. (av. 20%). Ca arsenate and eradicant spraying with nitraphene against gooseberry powdery mildew [*Sphaerotheca morsuvae*: **38**, 324] reduced incidence from 60 to 36%, increased av. yield per bush from 1·8 to 3·6 kg., and the weight of healthy berries from 0·8 to 2·7 kg. Anthracnose of currants [*Pseudopeziza ribis*: **35**, 864] with nitraphene and Bordeaux was 8·6%, as against 41·3% with the latter alone. Septoriosis [*Septoria ribis*: loc. cit.; **37**, 709] was 12·5 and 35·5%, respectively. Nitraphene was also technically highly effective for eradicating apple scab [*Venturia inaequalis*: cf. **39**, 234]. From the effect of nitraphene on vine it can be seen that eradicant spraying with subsequent cover spraying with non-Cu organic fungicides gives better results than cover spraying with Bordeaux. The preparation is a dark brown viscous liquid, consisting of Na salts of the products of alkylphenol nitration with the addition of a wetter, OP-7.

Lindström (O.). **Seed disinfection. Fungicide and dye distribution in liquid seed treatment.**—*J. agric. Fd Chem.*, **8**, 3, pp. 217–224, 1 diag., 4 graphs, 1960.

In this further joint contribution from AB Casco, Stockholm, and Res. Dept, Panogen Co., Woodstock, Ill., a new chemical method is fully described which permits the assay of individual whole cereal kernels for the distribution of Hg following seed treatment, the fungicide used in these experiments being Swedish panogen 4925 containing 8% by wt. Hg as cyano(methylmercuri)guanidine.

The results of previous studies by radioactive tracer methods, involving only part of the kernel surface [**38**, 567], were confirmed, and further proof was obtained of the different modes of distribution of fungicide and dye. It was also demonstrated that the efficiency of panogen was not impaired by a reduction of the dosage even below the small amounts normally recommended. Because of vapour action, as illustrated by simultaneous treatment with non-volatile tracer and labelled Hg, a reasonably uniform Hg distribution is secured under both laboratory and commercial conditions.

Edgington (L. V.) & Dimond (A. E.). **Effect of charge of ionized chemotherapeutants on their translocation through xylem.**—Abs. in *Phytopathology*, **50**, 4, pp. 239–240, 1960.

The movement of organic ions through vessels is governed by the negatively charged surface resulting from the Helmholtz double layer at the xylem walls. Chemical and biological detection of organic ions in tomato cuttings showed that compounds with anionic toxophores, such as Na dodecyl benzene sulphonate, were systemic, whereas cationic toxophores, such as the dimethyldidodecyl ammonium ion, were toxic only to the stem bases. Stem sections and cellulose disks were exposed to the compounds and analysis made of the amounts (1) removed from solution, (2) eluted from the cellulose by washing, and (3) retained by adsorption.

Anionic materials were eluted; cationic were not, but are absorbed on stems and disks by the charged surface (in quantity depending on the magnitude of the charge on the chemotherapeutant), where they remain fungitoxic. Anionic compounds move freely into the leaf blades.

Groves (A. B.) (Editor). **Results of 1959 fungicide-nematocide tests.**—76 pp., American Phytopathological Society, 1960. $1 from A. B. Groves, Winchester Fruit Res. Lab., Winchester, Va, U.S.A.

This report [cf. **38**, 125] includes brief summaries of results obtained by some 90 investigators in 35 States and provinces of the U.S.A. and Canada and a few other countries from trials with more than 350 fungicides, etc. (derived from 66 manufacturers) against many diseases of a wide range of crops. The reports are summarized according to the types of crops (fruit, vegetables, ornamentals, and turf) and notes on the performances are given under the types of products used (foliage and turf fungicides, antibiotics and growth substances, seed and soil fungicides, nematocides). An appeal is made for reports of 1960 trials.

Omagiu lui Traian Săvulescu cu prilejul împlinirii a 70 de ani. [Homage to Traian Săvulescu on the occasion of his 70th birthday.]—xxxvii+1179 pp., Bucureşti, Editura Academici Republicii Populare Romîne, 1959. [Numerous pl., fig., graphs, maps, and ref.] 39*s*. 5*d*.

Among the 114 contributions covering a wide field of science are many concerned with mycology and phytopathology. The titles relating to mycological taxonomy have been included in the C.M.I. *Bibliography of Systematic Mycology*, 1959. Those on plant diseases will be noticed in this *Review*.

Nienhaus (F.). **Das Wirtsspektrum von Phytophthora cactorum (Leb. et Cohn) Schroet.** [The host range of *P. cactorum*.]—*Phytopath. Z.*, **38**, 1, pp. 33–68, 1960. [Engl. summ. 279 ref.]

A host list of 157 plant spp. was compiled from the literature at the Inst. für Pflanzenkrankheiten der Rheinischen Friedrich Wilhelms Univ., Bonn. In inoculation experiments 155 of 184 spp. were infected. *Daphne* was established as a new host and *Antirrhinum majus* was infected for the 1st time in Germany. In the author's own experiments 39 of 70 weed spp. were infected by *P. cactorum* from apple.

Whereas *P. cactorum* attacks an exceptionally large number of spp. of Rosaceae (in 23 countries), *P. parasitica* attacks primarily Solanaceae (40 countries), and *P. palmivora* palms (27 countries) and Araceae (13 countries). In addition, *P. parasitica* is widespread on *Citrus* spp. (28 countries), *P. palmivora* on cacao (32 countries); all other diseases caused by these 3 *P.* spp. are so far restricted to few countries.

Hockenhull (D. J. D.) (Editor). **Progress in industrial microbiology. Vol. 2.**—vii+194 pp., 8 fig., 10 graphs, London, Heywood & Co. Ltd., 1960. 45*s*.

The reviews in the present volume [cf. **38**, 451] include 'The biochemistry of

streptomycin production', by the editor (pp. 131–165; 77 ref.), and 'Fungal synthesis of citric, fumaric, and itaconic acids', by D. Perlman & C. J. Sih (pp. 167–194; 200 ref.).

Gardner (Annesta R.). **Fungi are your product problem.** —*Prod. Engng*, **31**, 3, pp. 52–55, 2 fig., 1 col. map, 1960.

Essential information, presented in popular terms, on the prevention of [unspecified] fungal damage on electronic equipment [cf. **35**, 624 *et passim*].

Antifungal treatment of paper, board and textiles. Reprinted from *Packaging*, Feb., 3 pp., 2 graphs, 1959.

A note recommending cunilate (solubilized copper-8-quinolinolate) [cf. **39**, 7 *et passim*] and giving examples of its use and technical data concerning certain formulations.

Porter (Blanche R.), Carra (J. H.), Tripp (V. W.), & Rollins (Mary L.). **Effect of cellulase on Cotton fiber microstructure. Part I: Degradation by cellulase in fungal growth filtrates. Part II: Degradation during growth of cellulolytic microorganisms.** *Text. Res. J.*, **30**, 4, pp. 249–258, 15 fig., 4 graphs, 1960.

These studies at the S. Regional Res. Lab., New Orleans, La. are described and discussed in relation to previous investigations on comparable aspects of the subject. The electron-microscopic examination of Deltapine cotton fibres, after exposure to cellulase in filtrates from *Myrothecium verrucaria* cultures, revealed transverse, jagged cuts in the cellulose structure. The degradation was apparently localized in areas along the length of the fibre unrelated to any recognized component of fibre structure. Micrographs of fragmented, degraded fibres showed etching of the macrofibrils of the sheets of the secondary wall and a sharpening of the image of the individual microfibrils. Continued enzymatic attack produced smaller fragments and hydrocellulose-like particles. Measurements of changes in tensile strength, swelling in alkali, and in glucose yield were correlated with microstructural alterations. The extent of fibre degradation by cellulolytic culture filtrates was restricted and could be continued only if the fibres were swollen between exposures. No evidence of damage to the cellulose structure was observed which was not explicable by hydrolysis at the β-1,4-glucosidic linkage.

Further observations along the same lines were concerned with the action on the fibres of cultures of *M. verrucaria* and *Cellvibrio fulvus*. The bacterial colonies, growing in the folds of the primary wall, caused diagonal or longitudinal splitting of the surface, whereas fungal degradation was marked by transverse cracks in the wall. Other changes in fibre microstructure were similar for both organisms. In areas of intensive attack surface replicas showed single fibrils detached from the underlying structure, while on mercerized samples the surface structure was sometimes obscured by hydrocellulose-like particles. Fragmentation patterns denoted a continuous breaking-down of the fibrillar structure into small fragments and particles. The final degradation products revealed by electron micrographs resembled particles produced by a limited, heterogeneous acid hydrolysis, but positive identification with hydrocellulose particles was not established. Cottons modified to produce a more expanded microstructure with higher amorphous cellulose content were much less resistant to microbial invasion. Attack by growing micro-organisms was more severe and rapid than degradation by culture filtrates of cellulolytic fungi, but the mode of breakdown was comparable.

Jacks (H.). **A note on fungi isolated from stained wool. A note on fungi isolated from plants.**—*N.Z. J. agric. Res.*, **2**, 1, p. 152, 1959; **3**, 2, pp. 250–252, 1960.

At Massey agric. Coll., Palmerston North, pieces of stained wool [cf. **29**, 375]

from sheep, washed in sterile water, plated on Czapek-Dox or potato dextrose agar, and incubated at 20° C. produced almost pure colonies of fungi tentatively identified as *Phoma* spp., *Chaetomium* spp., *Epicoccum* spp., and *Macrosporium* spp. and characterized by intense pink-to-red, olive-green, yellow-to-brown, or grey-to-black pigmentation.

In the 2nd study seed of 29 pasture grasses, legumes, and weeds was sown in Manawatu silt loam in pots and the soil inoculated with spores of *C.*, *E.*, and *P.* Isolations from all parts of the plants yielded fungi of 26 genera, 43% of them having previously been isolated from wool. The results are tabulated and indicate that wool could be stained when sheep lie down, especially when conditions favour fungal growth.

Safarik (P.) & Vintrová (Mme E.). **A contribution to the occurrence of molds in tanneries.** *Věda Výskum. Průmyslu Kožel.*, **4**, pp. 93–100, 1958. [*J. Amer. Leath. Chem. Ass.*, **55**, 3, p. 193, 1960.]

The following developed on plates of Czapek-Dox agar exposed for 5 min. daily during 2 months at 5 locations in Czechoslovakia: *Penicillium* 60%, *Aspergillus* 17, *Paecilomyces* 12, *Rhizopus* 6, and *Trichoderma* 4. Most of the moulds can split tannin. Of the yeasts *Torula*, *Rhodotorula*, and *Saccharomyces* predominated. Contamination was heaviest in the hide cellar, followed by the beamhouse and suspender yard, the finishing department being only lightly infested.

Cooke (W. B.). **Fungi in polluted water and sewage. IV. The occurrence of fungi in a trickling filter type sewage treatment plant.**—*Proc. 13th Purdue industr. Waste Conf.*, Ser. 96, **43**, 3, pp. 26–45, 1 fig., 1959.

Cooke (W. B.) & Ludzack (F. J.). **Predacious fungus behaviour in activated sludge systems.** Cooke (W. B.) & Bartsch (A. F.). **Aquatic fungi in water with high waste loads.**– *Sewage industr. Wastes*, **30**, 12, pp. 1490–1495, 3 fig., 1958; **31**, 11, pp. 1316–1322, 1959.

Cooke (W. B.). **Trickling filter ecology.** –*Ecology*, **40**, 2, pp. 273–291, 1 diag., 6 graphs, 1959.

Cooke (W. B.). **Are fungi important in sewage treatment?** *Publ. Wks Mag.*, **90**, 1, pp. 113–114, 2 fig., 1959.

In further studies [cf. **38**, 183] 112 fungal spp. were found in the Ohio sewage treatment plant, of which at least 29 belonged to a permanent population. These fungi are believed to contribute to the reduction process.

The 2nd paper notes that the impaired functioning of activated sludge units owing to the presence of the predacious fungus *Zoophagus insidians* was successfully corrected by chlorination (sodium hypochlorite). In the 3rd study the information on fungi gained by 'baiting' streams which received domestic sewage and industrial wastes was of no value in indicating pollution, probably because of the brevity of exposure and washing away of polluted water by flooding.

An outline of studies on the trickling filter population is given in the 4th paper, including a list of organisms isolated from the filters. In the 5th paper some fungi pathogenic to man and commonly occurring in sewage effluents are noted and the role of fungi in utilizing various waste products in the effluent is discussed.

Emeis (C. C.) & Windisch (S.). **Prüfung der Kernwertigkeit polyploider Hefen mit der Massenisolationstechnik.** [Assay of the nuclear valency of polyploid yeasts by the mass isolation technique.] –*Naturwissenschaften*, **47**, 9, pp. 210–211, 1960.

The application of the method already reported from the Institut für Gärungsphysiologie, Berlin [**38**, 70], to the present problem is explained.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **8**, 4, pp. 48–51; 5, pp. 60–62, 1960.

Brazil. Details are given of Ministerial Order of 4 Nov. 1959 (*Diario Oficial*, 9 Nov. 1959), which revokes Article 6 of the Resolution of 19 Nov. 1934 [**14**, 544], concerning plant products the importation of which into Brazil requires a phytosanitary certificate.

Israel. By virtue of the Plant Protection Law 5716, of 1956, the Minister of Agric., Israel, has issued Plant Protection Regulations (Import of Plants) No. 5719, of 1959, which came into force on 4 Sept. 1959 and revoked the Plant Protection (No. 2) Order, 1934 [**13**, 672]. Full details are given.

Argentina. Decree No. 13501 of 27 Oct. 1959 (*Diario Oficial*, 67, No. 19085, 13 Nov. 1959) prohibits the importation into Argentina of the pollen of Rosaceae.

India. Notification No. 6–10/57-PPS of 18 Jan. 1960 prohibits the importation into India of potato plants, including tubers, except tubers imported for research by the government.

New Guinea. Plant Quarantine Ordinance of 30 June 1959 (*Netherlands N. Guinea Govt Gaz.* 27, 1959) constitutes the basic legislation governing the importation into Netherlands New Guinea of live plant material. It revokes the Ordinance of 27 Sept. 1926, as amended by that of 14 Oct. 1932. Decree No. Ez 59–98 of 17 Oct. 1959, as amended by Decrees No. Ez 59–121 of 27 Nov. 1959 and No. Ez 60–9 of 5 Jan. 1960, contains the Executive Regulations Plant Quarantine Ordinance, details of which are given.

Schmiederknecht (M.). **Feuchtigkeit als Standortfaktor für mikroskopische Pilze.** [Humidity as a habitat factor for microscopic fungi.]—*Z. Pilzk.*, N.F., **25** (*1959*), 3–4, pp. 69–77, 2 fig., 5 graphs, 1960.

Studies at the Inst. Phytopath., Aschersleben, Germany, led the author to a reappraisal of Walter's humidity groupings for micro-organisms and Heintzeler's modification [**18**, 610]. He designates as hygrophile the spp. with straight line or concave curves (with opt. at 100% R.H.) for relative growth (germination and sporulation) intensity with diminishing R.H., other conditions being opt.: as mesophile those with convex growth curves; and xerophile with a curve first ascending, then opt., then falling. Included in the 1st group are *Rhizoctonia* [*Corticium*] *solani* [**33**, 496], *Ophiobolus graminis*, *Thielavia basicola*, *Verticillium alboatrum*, and *Beauveria bassiana*; in the 2nd *Fusarium* spp., *Helminthosporium papaveris* [*Pleospora calvescens*], *Gloeosporium fructigenum* [*Glomerella cingulata*], *Rhizopus nigricans* [*R. stolonifer*], and *Oospora lactis* [*Geotrichum candidum*]; and in the 3rd *Aspergillus niger*, *A. glaucus*, *Pseudopeziza medicaginis*, and the powdery mildews (Erysiphaceae). Apart from these differences, the humidity requirements of individual organisms depend on the stage of their life cycle and are generally high during incubation and low during infection; in powdery mildews, however, they are low throughout the whole cycle.

Burges (A.) & Latter (Pamela). **Decomposition of humic acid by fungi.**—*Nature, Lond.*, **186**, 4722, pp. 404–405, 1960.

At the Dept Bot., Univ. Liverpool, a number of organisms capable of decomposing humic acid were isolated after a prolonged series of percolation experiments: of these, the 2 most active were fungi, provisionally referred to as *Spicaria* and *Polystictus*. Tests on *P. versicolor*, *Hypholoma fasciculare*, and *Trametes rubescens* revealed their ability to decompose humic acid.

Sims (A. C.) **Effect of culture substrate on the virulence of single-basidiospore isolates of Pellicularia filamentosa.**—*Phytopathology*, **50**, 4, pp. 282–286, 2 fig., 1960.

This information on *Corticium solani* has been noticed [**37**, 397].

Agarwal (G. P.) & Shinkhede (C. G.). **Physiological studies of Helminthosporium rostratum Drechs.**—*Phyton*, **13**, 1, pp. 45–54, 1959. [35 ref.]

At the Dept Bot., Mahakoshal Mahavidyalaya, Jabalpur, India, sporulation of *H. rostratum* [**37**, 78] was good at pH 8·1–10·5 (opt. 10·5) and with all C sources tested except starch and sucrose, with which it was moderate. Asparagine yielded the best dry wt., and opt. conc. of maltose substrate was 14 g./l. Spore size was influenced by various compounds, the smallest being with urea and the largest with $(NH_4)_2SO_4$, $NaNO_3$, and asparagine.

Gorlenko (M. V.) & Uspenskaya (Mme G. D.). Биохимический метод определения паразитизма у грибов из рода **Stemphylium.** [Biochemical method for the determination of parasitism by fungi of the genus *Stemphylium.*]—*C. R. Acad. Sci. U.R.S.S.*, **131**, 3, pp. 695–696, 1960.

In further studies at M. V. Lomonosov Moscow State Univ. [**38**, 308] parasitic spp. of *Stemphylium* accumulated about 4 times less amino N than saprophytes in a nutrient medium containing peptone. Isolates of *S. ilicis* from soil and paper differed sharply in this respect from the more parasitic strs. of the same sp. from apple and pine seeds. A physiological adaptation to the nutriment of plant tissues, therefore, takes place in *S. ilicis*. Similar results were obtained in the same laboratory by D. Osogostokiĭ with *Helminthosporium* spp.; *H. turcicum* from maize accumulated 8 mg. amino N g. dry wt. and *H. rostratum*, a weak parasite, 13·6 mg.

Sagromsky (H.). **Zur lichtinduzierten Ringbildung. V. Nachklingen der Rhythmik bei Sclerotinia fructicola (Wint.) Rehm.** [On light-induced zonation. V. Re-echo of the rhythm in *S. fructicola.*]—*Biol. Zbl.*, **78**, 4, pp. 589–597, 5 fig., 1959.

The phenomenon was studied at the Institut für Kulturpflanzenforschung, Gatersleben, Germany, with special reference to recent investigations by Jerebzoff [**39**, 387]. The rhythm induced by 12-hr. alternations of light and darkness persisted in continuous darkness, but not in continuous light. Transition from continuous light to continuous darkness resulted in zonation of the dark mycelium, but there was none when continuous darkness was replaced by continuous light. Zones developed in cultures maintained in darkness which was interrupted by 1 hr. of light.

Ikegami (H.). **Effect of light on maturation of apothecia of Sclerotinia trifoliorum.**—*Ann. phytopath. Soc. Japan*, **24**, 5, pp. 273–280, 1 pl. (9 fig.), 2 graphs, 1959. [Jap. Abs. from Engl. summ.]

At the Faculty Agric., Univ. Gifu, Naka, the maturation of apothecia [cf. **36**, 128] from sclerotia of *S. trifoliorum* [cf. **38**, 701] planted in moist sand at 15–20° C. was not affected by darkness for 10–15 days before exposure to natural light: only 30% apothecia matured after 25 days' dark treatment, and none after 40 days. Apothecia matured under continuous fluorescent light or after 3 days of alternating light and darkness, but not after 15 days of alternating light and darkness; in other treatments involving such alternate changes all stages of apothecial development were obtained. Maturation occurred in light filtered through colourless, yellow, blue, green, and violet cellophanes, but not red; 100% maturation occurred in light intensity of 1,000–1,400 lux, 78% in 600 lux, 50% (intermediate maturation) in 200 lux, and none in and below 100 lux.

Katsura (K.) & Nishioka (M.). **Studies on the physiology of sporangial germination of Phytophthora capsici Leonian. (3). Influence of four carbon sources upon the two types of germination of zoosporangia. (4). Influence of diffused light and ultra-violet radiation upon the two types of germination of zoosporangia.**—*Sci. Rep. Kyoto Univ. Agric.* (formerly *Sci. Rep. Fac. Agric. Saikyo*

Univ.) 11, pp. 44–48, 4 graphs; pp. 49–51, 1959. [Jap. Abs. from Engl. summ.]

In the 3rd contribution to this series [cf. **37**, 453; **39**, 395] indirect germination was inhibited by solutions of 0·01, 0·05, 0·1, 0·25, and 0·5 mols. of xylose, maltose, galactose, and soluble starch at 20° C. In 0·5 mol. solutions of xylose and galactose internal zoospore differentiation occurred in some sporangia but germination was inhibited. In soluble starch (0·5 mols.) 2·9% sporangia showed zoospore differentiation at 20° though no indirect germination was observed at 26°.

Neither method of germination was affected by light or dark treatment. Ultraviolet radiation for 1 min. inhibited indirect germination and was lethal after 3 min., but had little effect on direct germination.

Masago (H.). **Studies on the effects of radiation on microorganisms. (4). Contribution for practical use of ultraviolet sterilization.** —*Ann. phytopath. Soc. Japan*, **24**, 4, pp. 229–233, 2 graphs, 1959. [Jap. Abs. from Engl. summ.]

In further studies [**39**, 277] irradiation by a germicidal lamp was more efficient for sterilization at a lower temp., because at higher temp. the decrease in radiation efficiency was greater than the increase in U.V. sensitivity of the micro-organisms. The visible and near-U.V. light from an artificial sun lamp accelerated the lethal action of the germicidal lamp. Common cellophane was more efficient in packing for sterilization as it absorbed U.V. light to a smaller extent than damp-proofed cellophane.

Bertossi (F.). **Inibizione della crescita di alcune Ustilaginales in presenza di indolo.** [Inhibition of the growth of some Ustilaginales in the presence of indole.] —*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 202–209, 1960. [22 ref.]

Experimental evidence is presented showing that indole exerts a fungistatic and fungicidal effect upon *Ustilago maydis*, *Tilletia horrida*, and *Tolyposporium ehrenbergii*.

Taber (W. A.) & Vining (L. C.). **A comparison of isolates of Claviceps spp. for the ability to grow and to produce ergot alkaloids on certain nutrients.**—*Canad. J. Microbiol.*, **6**, 3, pp. 355–365, 5 graphs, 1960. [17 ref.]

In further studies at the Prairie Regional Lab., Saskatoon [**38**, 364], isolates of *Claviceps purpurea* and *C.* spp. from various parts of the world were compared on different C and N sources. The quantity of alkaloid produced was found to depend upon both, but there was no correlation between the ability to produce alkaloid and the utilization of carbohydrates. Most alkaloid-producing cultures were able to utilize more than 1 C source, and the carbohydrate permitting opt. production varied from one isolate to another. All the strs. were able to utilize succinic acid for growth, but none could utilize L-tryptophane as either a C or N source.

Basu (S. N.) & Ghose (S. N.). **The production of cellulase by fungi on mixed cellulosic substrates.**—*Canad. J. Microbiol.*, **6**, 3, pp. 265–282, 1960. [27 ref.]

At the Indian Jute Mills Ass. Res. Inst., Calcutta, 124 fungi were tested for production of cellulase, which could hydrolyse powdered filter paper and swollen cellulose, by growing them on jute, alkali-treated jute, holocellulose, α-cellulose and hemicellulose prepared from jute, and filter paper. Though an enzyme capable of decomposing pure cellulose was produced by only 48 spp. when grown on pure cellulose, it was produced by most of the test organisms when they were grown on mixed cellulosic substrates. Enzyme production on such substrates was stimulated by micronutrients and hemicellulose. Many of the spp. thus induced to form cellulase are usually regarded as non-cellulolytic.

McClendon (J. H.), Somers (G. F.), & Heuberger (J. W.). **The occurrence of a variety of enzymes hydrolyzing cell wall polysaccharides in Apples rotted by Botryosphaeria ribis.**—*Phytopathology*, **50**, 4, pp. 258–261, 1 graph, 1960. [21 ref.]

At Univ. Del., Newark, freeze-dried enzyme preparations from apples rotted by *B. ribis* [**39**, 179], freed from non-colloidal material, hydrolysed the galacturanan, galactan, and araban moieties of pectin, and also galactomannan, xylan, and pectin ester groups, but not cellulose. Preparations from sound apples and tomatoes behaved like the rotted apples, but their mode of action and change of activity with pH often differed. Against pectin esterase the sound apple preparations were as effective as the rotten, or more so. There appeared to be several enzymes present hydrolysing galacturonan and galactomannan. Buffer extracts of the press cake of rotten apples gave more active preparations than juice initially expressed.

Turner (Elizabeth M. C.). **An enzymic basis for pathogenic specificity.**—*Nature, Lond.*, **186**, 4721, pp. 325–326, 1 fig., 1960.

The fungus inhibitor found in oats at the Bot. Dept, Oxford [**35**, 886], has now been purified and named 'avenacin'. Glucosidase activity against avenacin in the culture filtrates of *Ophiobolus graminis* and its var. *avenae* and some other fungi occurred only in certain isolates of *O.g.* var. *avenae*: the enzyme responsible appears to be specific. Glucosidase activity was lost after 24 hr. and much reduced by addition of 2 drops of hydrogen peroxide to the enzyme extract.

Gordon (W. L.). **Distribution and prevalence of Fusarium moniliforme Sheld. (Gibberella fujikuroi (Saw.) Wr.) producing substances with gibberellin-like biological properties.** *Nature, Lond.*, **186**, 4726, pp. 698–700, 1960.

Of 84 isolates of *G. fujikuroi*, 17 of *F. moniliforme* var. *subglutinans*, and 4 of *F.m.* var. *anthophilum* (each established as a monospore culture) from 29 countries, tested at Canada Dept Agric. Res. Sta., Winnipeg, on the recessive mutant 'dwarf-1' of maize, 23, 11, and 1, respectively, produced gibberellins. They were geographically unrestricted as to origin and were found on a range of host plants and other substrata.

Brian (P. W.). **Griseofulvin.** *Trans. Brit. mycol. Soc.*, **43**, 1, pp. 1–13, 2 graphs, 1960. [57 ref.]

In this presidential address the discovery, production, mode of action, and nature of griseofulvin are reviewed, together with its systemic distribution in plants and use as a fungicide and for the control of animal mycoses.

Gambogi (P.). **Comportamento, in vitro, di alcune specie di Phytophthora di fronte ad actidione e nistatina.** [The behaviour *in vitro* of some *Phytophthora* species in the presence of actidione and nystatin.]—*Agricoltura ital.*, **59** (N.S. **14**), 12, pp. 373–377, 8 graphs, 1959.

At Univ. Pisa it was demonstrated that *P. capsici*, *P. parasitica* var. *nicotianae*, and *P. cactorum* were all sensitive to actidione, whereas *P. cactorum* alone was affected by nystatin.

Goodman (R. N.). **Colletotin, a toxin produced by Colletotrichum fuscum.**—*Phytopathology*, **50**, 4, pp. 325–327, 1 fig., 1960.

Information already noticed [**39**, 280].

Faivré-Amiot (A.) & Staron (T.). **Activité antibactérienne d'un nouvel antibiotique produit par un champignon.** [Antibacterial activity of a new

antibiotic produced by a fungus.]—*C.R. Acad. Sci., Paris*, **250**, 17, pp. 2942–2944, 1960.

An unidentified fungus [which is briefly characterized] isolated from freshly fallen *Eucalyptus* leaves produced a new antibiotic (CE 58) exerting a powerful inhibitory action *in vitro* at 26° C. on *Agrobacterium gypsophilae* and *A. tumefaciens* (min. conc. 800 μg./ml. medium containing 20 g. peptone, 2 g. dextrose, 5 g. NaCl, and 1,000 ml. distilled water); *Corynebacterium fascians*, 3·12 μg., *Erwinia amylovora*, 400, *E. atroseptica*, 800, *E. carotovora*, 400, *Pseudomonas angulata*, 800, *P. glycinea*, 200, *P. medicaginis* var. *phaseolicola* [*P. phaseolicola*], 400, *P. mori*, 1·5–3·12, *P. savastanoi*, 3·12, *P. tabaci*, 800 [cf. **39**, 625], *Xanthomonas beticola*, 800, and *X. campestris*, 400.

Tomato, lettuce, strawberry, and carnation tolerated a spray of CE 58 at 250 μg./ml. without ill effects; but the germination of flax seed was reduced from 100 to 92% (with a long delay in emergence) by 500 μg., to 6·4 by 1,000, and to 0 by 2,000 μg.

Marcelli (E.) & Capozzi (A.). **Azione antagonistica del manganese nei riguardi della streptomicina.** [The antagonistic action of Mn on streptomycin.]—*Tabacco*, **64**, 694, pp. 80–88, 6 fig., 1960. [Engl. summ.]

In laboratory and greenhouse tests at the Laboratorio di Fitopatologia dell' Istituto Scientifico Sperimentale per i Tabacchi, Scafati, $MnCl_2$ supplied with streptomycin reduced the inhibition of growth and the partial albinism induced in tobacco plants by the antibiotic [cf. **38**, 185].

Tul'chinskaya (Mme A. V.). Антибиотические вещества в семенах растений. [Antibiotic substances in plant seeds.]—Науч. Докл. высш. Школ. [*Nauch. Dokl. vÿssh. Shkol.*], Biol. Sci., *1960*, 2, pp. 162–166, 1960. [1 p. ref.]

This survey of work in the Soviet Union and abroad [**39**, 389] incorporates the results of the author's researches on seed phytoncides of 45 spp. of economic, officinal, and food plants. Antibiotics from *Cydonia oblonga* were active against bacteriosis (*Xanthomonas vesicatoria*) [**31**, 213] and canker (*Corynebacterium michiganense*) [**38**, 628] of tomato, alcohol extracts at 1:1,000 acting bacteriostatically against the former.

Marshall (K. C.), Whiteside (Jean S.), & Alexander (M.). **Problems in the use of agar for the enumeration of soil microorganisms.**—*Proc. Amer. Soc. Soil Sci.*, **24**, 1, pp. 61–62, 1960.

At Cornell Univ., Ithaca, N.Y., various soil types were examined to determine the relative abundance of micro-organisms capable of growth in an inorganic salts medium with agar as the sole C source.

Exceptionally high counts were obtained when the medium used for soil dilutions contained commercial grade Bacto (Difco), Noble (Difco), or a highly purified agar from the Atlantic Regional Lab., Halifax, N.S.; max. values occurred on Bacto and the min. on the purified preparation (which contains 98% of the gelling component as compared with about 85 in the commercial grade). To ascertain the effect of substrate purification 23 colonies from the Bacto plates were subcultured on Noble. Equally good growth on both media was made by 43%, reduced development was shown by 35 and virtual absence of growth by 22%.

Comparative counts of the total microbial populations developing from samples of 6 Central Amer. soils on the salts medium with the 2 commercial agars, soil extract, Jensen's casein, and glycerol agar are tabulated. Supplementation of the medium with organic nutrients frequently resulted in a statistically significant increase, in other cases the estimates were lowered, while only very rarely was the count raised by a factor of 2-fold even with the best of the substrates. It is evident,

therefore, that the soils examined contain a large number of micro-organisms capable of growth even without the addition of simple C nutrients.

Colonies did not liquefy or soften the agar, yet faint but definite zones of decomposition were detected by the use of I_2-KI solution. Hence it would seem that at least part of the growth is attributable to the breakdown of agarose, but the differential developments on the 3 types of agar point to the utilization of the contaminating, non-gelling materials.

To determine whether the organisms were developing on organic compounds present as impurities in the distilled water, 9 isolates were inoculated on to inorganic salts medium with highly purified agar and into the inorganic liquid medium prepared from deionized, distilled water treated with $KMnO_4$ and redistilled. Only 1 failed to grow on the agar.

It is apparent that agar is not an inert solidifying agent and that caution is needed in the acceptance from such media of data on the numbers and kinds of soil micro-organisms capable of utilizing specific C substrates.

Thornton (R. H.). **Biological studies of some tussock-grassland soils: XII. Soils and vegetation of two cultivated sites. XIII. Fungi of two cultivated soils.**

Di Menna (M[argaret] E.). **XIV. Yeasts of two cultivated soils.**—*N.Z. J. agric. Res.*, **3**, 2, pp. 197–202; pp. 203–206; pp. 207–213, 1960.

At D.S.I.R., Wellington, further analysis [cf. **39**, 219] of soil fungi by a screened immersion plate method showed little qualitative difference between natural tussock and the same area under crops or introduced pastures. The number of isolated mycelia was higher under crops and pastures than under tussock in both soils. The commoner fungi isolated are listed.

A similar analysis of yeasts, the results of which are tabulated, showed a slight increase in number when tussock became cultivated in one of the soils examined, but a decrease and some change in spp. pattern in the other. As with the fungi, the counts were higher in summer than in spring. *Candida humicola* appeared to belong to the rhizosphere of tussocks, but not of introduced pasture plants. The commonest sp. isolated in spring from the leaves of both tussock and pasture plants was *Cryptococcus laurentii*.

Hepple (Shirley). **The movement of fungal spores in soil.**—*Trans. Brit. mycol. Soc.*, **43**, 1, pp. 73–79, 3 graphs, 1960.

At the Dept Bot., Univ. Liverpool, use of Burges' method [**29**, 532], with some modifications, showed the downward movement of spores of *Mucor ramannianus* in a tube of sand caused by washing, and similar movement through soil from the A_1 and A_2 horizons of a podsol from Delamere Forest, Cheshire, though this was checked by soil from the B_1 horizon (20–30 cm.), at which level dilution plate methods had demonstrated a concentration of the fungus. It is shown, however, that natural rainfall would not cause such movement to take place to any appreciable extent.

Démétriadès (S. D.) & Holevas (C. D.). **Les carences minérales observées sur les plantes cultivées en Grèce.** [Mineral deficiencies observed in cultivated plants in Greece.]—*Ann. Inst. phytopath. Benaki*, N.S., **2**, 3, pp. 184–192, 1 pl., 1959. [15 ref.]

Applications of organic salts at 0·1–0·2% and inorganic at 0·5–1% by various standard methods indicated that deficiencies in Mg [cf. **39**, 196], Fe, K, Zn, and Mn are widespread, whereas those of P and B are rare. The distribution of these deficiencies in citrus, pome, and stone fruits, and some other crops in Greece is noted.

Symposium on bicarbonates.—*Soil Sci.*, **80**, 5, pp. 241–302, 9 graphs, 1960.

Consisting of 11 contributions directly or indirectly concerned with the problem of lime-induced chlorosis in plants.

Altares (Maria del C. D.). **Photochemical decomposition of chlorophyll under iron deficiency.**—*An. Estac. exp. Aula Dei*, **6**, 1–2, pp. 1–80, 1959. [*Chem. Abstr.*, **54**, 6, col. 5844 d, 1960.]

In mature leaves of chlorotic plants, e.g. pear and groundnuts, grown in calcareous soils, high light intensity increases photodecomposition of chlorophyll. The ratio of chlorophyll b to a is higher in leaves exposed to weak light than in those in intense natural light, owing to the greater photolability of the former. Under induced Fe deficiency chlorotic symptoms disappear more rapidly when light intensity is decreased than after injections of 0·025% $FeSO_4$. Both methods cause an increase of soluble Fe and catalase activity. The ratio of ascorbic acid [vitamin C] to chlorophyll, higher in chlorotic than in green foliage, decreases with light intensity.

Weber (Anna). **Molybdoenmangel.** [Molybdenum deficiency.]—Reprinted from *Gärtner. Tidende, 1960*, 13–14, 6 pp., 5 fig., 1960.

A summary of available information based on a comprehensive survey of the literature, with special reference to Mo deficiency in cauliflower in Denmark and elsewhere.

Knickmann (E.). **Pflanzenschäden durch Ölverschmutzung von Boden und Wasser.** [Plant damage through oil pollution of soil and water.]—*Umschau*, **60**, 4, pp. 118–119, 1960.

The problem of pollution caused by faulty apparatus is discussed in the light of recent experience in oil-heated greenhouses under the observation of the Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau, Geisenheim (Rheingau), W. Germany, where large areas of beds containing valuable material for the cut-flower market were severely and in some cases irretrievably damaged.

The leakage also spread down a gentle slope to a strip of an adjoining field, adversely affecting the crops of the next rotation, especially barley.

Nannfeldt (J. A.). **The mycofloristical exploration of Scandinavia, especially Sweden.**—*Friesia*, **6**, 3, pp. 167–213, 1959. [12 pp. ref.]

In this historical review, originally read at the Jubilee Meeting of the Danish mycol. Soc., Oct. 1955, the subject is dealt with under the headings: (1) the larger terricolous, mainly fleshy fungi, (2) the larger lignicolous, mainly tough fungi, (3) the parasitic microfungi, (4) saprophytic microfungi, (5) hypogaeous fungi, and (6) aquatic fungi. The distribution of spp. in the area is discussed.

Riley (E. A.). **A revised list of plant diseases in Tanganyika Territory.**—*Mycol. Pap.* 75, 42 pp., 1 map, 1960.

This list [cf. **32**, 697] includes a large number of new records and name changes of pathogens since 1953. Most have been noticed from the annual reports [**39**, 456].

Ramakrishnan (T. S.). **Notes on some fungi from South India. VIII.**—*Proc. Indian Acad. Sci.*, Sect. B, **51**, 4, pp. 164–168, 5 fig., 1960.

In this note from the Rubber Board, Kottayam, Kerala [cf. **37**, 215; **38**, 468], are included *Phytophthora palmivora*, causing severe defoliation of *Artocarpus hirsuta*; *Sclerotium rolfsii*, causing a branch die-back of shaddock; *Pellicularia filamentosa* [*Corticium solani*], responsible for a leaf blight of *Canna indica* and readily infecting the foliage of young *Hevea* rubber plants; and *Corynespora cassiicola*, causing a leaf spot on *Hevea* rubber [cf. **32**, 342].

Agarwal (G. P.), Nema (K. G.), & Beliram (R.). **Fungi causing plant diseases at Jabalpur (Madhya Pradesh)—1.**—*Proc. nat. Acad. Sci. India*, Sect. B, **29**, 5, pp. 310–315, 1959.

A list of pathogens found in and around Jabalpur on cultivated and wild plants, with host names. There is no host index.

Rayss (T[sharna]). **Quelques additions à la mycoflore d'Israël.** [Some additions to the mycoflora of Israel.]—*Bull. Res. Coun. Israel*, Sect. D, **8**, 1, pp. 1–14, 1959. [2 pp. ref. Engl. summ.]

This annotated list from the Hebrew Univ., Jerusalem [cf. **38**, 309, 675], includes 21 spp. new to the country and 14 new host records. *Erysiphe cichoracearum* on tobacco [**32**, 424], *E. communis* [*E. polygoni*] on beet, and *Uncinula necator* on vine [cf. **38**, 383] were found in the perithecial state.

Golato (C.). **Micoflora persiana. Primo elenco di batteri et miceti nocivi.** [Persian mycoflora. First list of injurious bacteria and fungi.]—*Riv. Agric. subtrop.*, **54**, 1–3, pp. 106–113, 1960. [Engl. summ. 16 ref.]

This list gives 4 spp. bacteria and some 100 spp. fungi on the most important wild and cultivated plants in Iran [cf. **38**, 132 *et passim*].

Pospelov (A. G.). Грибная флора Киргизии. [The fungus flora of Kirghizia.]—*In* Юбилейная науч. Сессия. Отдел. биол. Наук. Акад. Наук Киргиз ССР [Jubilee sci. Session. Dept biol. Sci., Acad. Sci. Kirghiz S.S.R.], Frunze, pp. 61–74, 1958.

A brief survey is given of the various collections of mycological materials made in Kirghizia [cf. **38**, 246]. At present the fungus flora is estimated at 1,400 spp. and f., of which ca. 530 spp. are parasitic on cultivated and the most economically valuable wild trees, fruits, and other plants. Some of the most important or common are mentioned under the main types of hosts.

Kohlmeyer (J.). **Wood-inhabiting marine fungi from the Pacific North-West and California.**—*Nova Hedwigia*, **2**, 1–3, pp. 293–343, 12 pl., 1960. [36 ref.]

A list of 7 Fungi Imperfecti and 30 Ascomycetes [cf. **38**, 493] with notes on their morphology, taxonomy, and cultural characters.

Yamamoto (W.). **Species of the Sclerotiniaceae in Japan.** *Trans. mycol. Soc. Japan*, **2**, 2, pp. 2–8, 1959. [Jap.]

This list, with keys to the 8 genera and 29 spp. (5 new comb.), includes *Sclerotium cepivorum* on onion and other *Allium* spp. [map 331].

Hiratsuka (N.). **Materials for a rust-flora of the Japanese Archipelago. I.**—*Trans. mycol. Soc. Japan*, **2**, 2, pp. 9–11, 1959.

This list of 23 spp. of Uredinales, contributed by the Lab. Phytopath. Mycol., Tokyo Univ., gives hosts and localities (including Formosa) and includes 5 new spp. and 3 new comb.

Ezdakova (Mme L. A.). О поражении дикорастущей растительности ржавчинными грибами. [On infection in wild plants by rust fungi.]—Труд. Узбек. гос. Унив. [*Trud. Uzbek. gos. Univ.*], N.S., Bot., 84, pp. 17–23, 1958.

Collections from an area near the vegetable gardens of the collective farm '23rd February', S.E. Samarkand, Tajik S.S.R., in 1953–55, included *Uromyces striatus* on lucerne, *Medicago lupulina*, and *Euphorbia helioscopia* [map 342], *Puccinia menthae* on *Mentha austriaca* and *M. longifolia* [map 211], and *P. cynodontis* on *Cynodon dactylon*.

Potatosova (Mme E. G.). Грибы рода **Typhula** в СССР. [Fungi of the genus *Typhula* in the U.S.S.R.]—*Bot. Zh. S.S.S.R.*, **45**, 4, pp. 567–572, 1960.

For the U.S.S.R. 14 spp. of *Typhula* [cf. **39**, 591] are recorded, each with host range, distribution in U.S.S.R. and elsewhere, and importance. Also studied were the methods of overwintering, periods of sclerotial formation and growth, specialization and variability of the morphological and cultural properties, and pathogenic features. Included are *T. trifolii* on clovers and other legumes and *Phleum pratense*, and *T. variabilis* and *T. intermedia*, both on many hosts.

Felix (S.). **A list of Cercospora occurring in Mauritius, with short notes on the newly recorded species of some economic importance.**—*Rev. agric. sucr. Maurice*, **39**, 1, pp. 9–14, 5 fig., 1960.

This list from Dept Agric., Mauritius, of 37 named and 18 unnamed *C.* spp. is arranged alphabetically with herbarium nos., new hosts, localities, and dates of collection. Notes on newly recorded spp. of economic importance are appended. These include *C.* [*Mycosphaerella*] *arachidicola* [map 166] and *C. personata* [*M. berkeleyii*] on groundnut, *C. canescens* on bean [*Phaseolus vulgaris*], *C. unamunoi* [**39**, 373] on *Capsicum annuum*, *Cercospora musae* [*M. musicola*] on banana [map 7], *C. timorensis* on sweet potato, *C. brassicicola* on *Brassica pekinensis* (pe-tsai), *C. cajani* on pigeon pea, *C. henningsii* on cassava, *C.* [*M.*] *citrullina* on *Luffa acutangula*, *C. longissima* on lettuce, *C. moringae* on *Moringa*, and *C. zinniae* on zinnia.

Booth (C.) & Murray (J. S.). **Calonectria hederae Arnaud and its Cylindrocladium conidial state.**—*Trans. Brit. mycol. Soc.*, **43**, 1, pp. 69–72, 1 fig., 1960.

Cylindrocladium macrosporum var. *hederae* [**30**, 346] parasitizing *Hedera helix* is shown to be the conidial state of *Calonectria hederae* [Booth & Murray] which is described as a new sp.

Nicot (Jacqueline). **Deux localisations curieuses du Phialophora atra v. Beyma.** [Two curious habitats of *P. atra*.] *C. R. Acad. Sci., Paris*, **250**, 26, pp. 3362–3364, 1 fig., 1960.

The fungus was identified in (1) sugar solutions in heavy water from the Laboratoire de Physique atomique du Collège de France, and (2) a culture from the inner wall of the base of an atomic pile, in water, isolated at the Centre d'Études nucléaires de Grenoble. On 2% malt extract and Czapek's medium submerged hyphae were sterile, light brown, 3·5 μ diam., with numerous anastomoses, and on the surface were more slender ones (2·5–3 μ), often asperulated, bearing brownish phialides, 10–12 × 3·5 μ, irregularly distributed, simple or branched, occurring singly or in bunches, and bearing endogenous, subhyaline, ovoid phialospores, 3·8–7·2 × 2·3 × 3·3 (mean of 20, 5·3 × 2·4) μ, with a finely granular content, which remain agglomerated in a mucous head at the apex of the phialide.

Barkai-Golan (R.). **Tuberculina persicina (Ditm.) Sacc. attacking rust fungi in Israel.**—*Bull. Res. Coun. Israel*, Sect. D, **8**, 1, pp. 41–46, 5 fig., 1959.

T. persicina [cf. **34**, 260; **37**, 85] was noted by the Hebrew Univ., Jerusalem, parasitizing aecidia of, *inter alia*, *Tranzschelia pruni-spinosae* on *Anemone coronaria*. Aecidiospores were not prerequisite for the germination of the conidia of the hyperparasite in hanging drops. Germination was best 1 day after collection but persisted for many months; opt. temp. was 23–25° C. Direct infection of the host leaves did not occur but conidia from one rust could infect aecidia of another sp.

Brady (Beryl L.). **Occurrence of Itersonilia and Tilletiopsis on lesions caused by Entyloma.**—*Trans. Brit. mycol. Soc.*, **43**, 1, pp. 31–50, 5 fig., 1960. [18 ref.]

Sampling surface spores on material chiefly collected in France, where a high

proportion of European *E.* spp. [**33**, 86] have been recorded, showed *I. perplexans* to be prevalent on lesions caused by *E.* and other plant pathogenic fungi, and occasionally on 'healthy' leaves. *T. washingtonensis* and *T. minor* were present on most leaves whether or not attacked by *E.* Chlamydospores of *E. calendulae* and *E. dahliae* germinate in the host, forming needle-shaped and allantoid sporidia; the latter resemble the ballistospores of *T. washingtonensis*, but are distinguishable when they germinate; the former produced characteristic symptoms of *E.* on inoculation: no connexion in the life cycles was established between *E.* and either *I. perplexans* or *T. washingtonensis*.

Misra (A. P.) & Haque (S. Q.). **Perfect stage of Sclerotium rolfsii Sacc.**—*Nature, Lond.*, **186**, 4724, p. 567, 1960.

At Bihar agric. Coll., Sabour, India, fruiting bodies of *S. rolfsii* [cf. **35**, 99] developed in cultures on Brown's agar incubated at room temp. (15·9–21·7° C.) for 33–39 days. This suggests that development depends on temp. and a low level of nutrients.

Donk (M. A.). **The generic names proposed for Polyporaceae.**—*Persoonia*, **1**, 2, pp. 173–302, 1960.

The family is taken in a broad, artificial sense, but excluding Boletaceae and 'Meruliaceae' *sensu lato*. Of the generic names listed 229 are considered valid, 37 invalid, and 6 are excluded. Details of valid publication, typification, homonymy, and status are given for each name.

Ingold (C. T.). **Spore discharge in Pyrenomycetes.**—*Friesia*, **6**, 3, pp. 148–163, 13 fig., 1 graph, 1959.

In this paper, read at the Jubilee Meeting of the Danish mycol. Soc., Oct. 1955, spore discharge as related to *Daldinia* spp., mainly *D. concentrica* [cf. **36**, 543], is discussed. An apparatus to measure nocturnal spore discharge, in which a series of slides were moved over the upper surface of a stroma so that each caught 2 hr. spore output, is described.

Tempel (A.). **Serologisch onderzoek bij Fusarium oxysporum.** [Serological investigations of *F. oxysporum*.] *Meded. Landbogesch., Wageningen*, **59**, 7, pp. 1–60, 7 pl. (9 fig.), 8 fig., 1959. [Engl. summ. pp. 54–57. 79 ref.]

In this comprehensive report from the Laboratorium voor Phytopathologie, Wageningen, the author, after reviewing the literature on the serology of plant pathogenic fungi, gives the results of his attempt to differentiate *F. oxysporum* f.sp. *callistephi*, *dianthi*, *lupini*, *narcissi*, and *pisi*, *F. oxysporum* from tulip, and an isolate of *F. culmorum* by serological methods.

Rabbits were immunized by culture liquids, homogenized mycelium in saline, mycelial extracts, and microconidial suspensions (by various régimes which are detailed) and culture liquids, mycelial extracts, and microconidia used as test antigens.

Microconidia agglutinated easily with highly diluted antisera (1 : 4096) but they also agglutinated with highly diluted normal serum.

Precipitin tests (the gel diffusion technique proving the most satisfactory) showed cross-reactions between formae speciales to be very common. Most antisera did not differentiate f.sp. but one antiserum against a culture liquid of *F.o.* f.sp. *pisi* and another against *F.o.* f.sp. *lupini* were specific.

Characterization of the antigens by physical and chemical methods, including electrophoresis, led to the conclusion that the mycelium contains glycoproteins which split into polysaccharides (which are haptens) and various proteins during autolysis in the cultures and during extraction. Antibiotics against polysaccharides could only be obtained by immunization with microconidia. The antigens of *F.*

oxysporum are more comparable with those of Gram+ than those of Gram— bacteria.

McGinnis (R. C.). **Note on the occurrence of binucleate pycniospores in species of Puccinia.**—*Canad. J. Pl. Sci.*, **40**, 1, p. 202, 1 pl., 1960.

At Canada Agric. Res. Sta., Winnipeg, Man., large binucleate spores were observed among the ordinary uninucleate haploid pycnospores of *P. graminis* and *P. helianthi*. The binucleate condition probably resulted from an additional mitosis at the time of pycnospore formation.

Lessel (E. F.). **The nomenclatural status of the generic names of the Actinomycetales.**—*Int. Bull. bact. Nom. Taxon.*, **10** (*Suppl.*), 2, pp. 87–192, 1960. [21 pp. ref.]

This useful compilation from the Iowa State Univ. of Sci. and Technol., Ames, consists of an alphabetical list of all the generic names which have been applied to actinomycetes with annotations on their nomenclatural and taxonomic status and other points of interest.

Hagedorn (H.). **Elektronmikroskopische Untersuchungen an Streptomyces griseus (Krainsky).** [Electron-microscopic studies on *S. griseus*.] *Zbl. Bakt.*, Abt. 2, **113**, pp. 234–253, 39 fig., 1960.

A comprehensive report from the Botanisches Institut der Universität Münster, Germany, on the study of ultra-thin sections of *S. griseus* [cf. **34**, 616], with critical references to previous investigations by other authors.

Mach (F.). **Elektronenoptische Untersuchungen über die Entstehung 'stachliger' Streptomyces-Sporen.** [Electron-optic studies on the origin of 'prickly' *S.* spores.]—*Experientia*, **16**, 4, pp. 142–143, 2 fig., 1960. [Engl. summ.]

Examination of an *S.* str. of sect. *Spira* [**38**, 498] on starch agar at 28° C. at the Botanisches Institut der Ernst-Moritz-Arndt Universität, Greifswald, Germany, revealed the origin of the 'prickles' on the spores from the membrane of the aerial mycelial hyphae. They could be decomposed by treatment with lysozyme (100μg/ml. in 0·03 M phosphate buffer) at pH 7.

Gurr (E.). **Encyclopaedia of microscopic stains.**—xii + 498 pp., London, Leonard Hill (Books), Limited, 1960. 95*s*. [18 pp. ref.]

This book is intended as a guide to the applications, structures, composition, molecular wts., and properties of dyes and other substances used for staining (arranged alphabetically). It aims at supplying information frequently required by medical and biological laboratory workers which is not readily available elsewhere. Some recipes and methods are given and others may be found in the literature cited. There is a comprehensive general index.

Illman (W. I.). **Estimating germinability of sclerotia.**—*Plant Dis. Reptr*, **44**, 4, p. 297, 1960.

This technique was devised at Carleton Univ., Ottawa, Ont., for the study of tomato anthracnose (*Colletotrichum phomoides*) [cf. **39**, 47]. Individual sclerotia on 4–5 mm. disks cut from plated medium are transferred to deeply poured plates of rose Bengal agar and germination recorded.

Kahn (R. P.) & Creech (J. L.). **The use of a petroleum hydro-carbon torch in the aseptic transfer of microorganisms and in routine laboratory glass blowing.**—*Plant Dis. Reptr*, **44**, 4, p. 296, 1 fig., 1960.

Used at U.S. Plant Introduction Sta., Glenn Dale, Md, the apparatus described is an alternative to the Bunsen burner (in the absence of gas) and the alcohol lamp.

Schley (D. G.), Hoffman (R. K.), & Phillips (C. R.). **Simple improvised chambers for gas sterilization with ethylene oxide.**—*Appl. Microbiol.*, **8**, 1, pp. 15–19, 4 fig., 1960. [12 ref.]

Three improvised chambers, viz., an autoclave, 55-gal. steel drums with different closures, and a polyethylene bag, were successfully used with an aerosol dispenser containing a mixture of 11% ethylene oxide, 44·5% dichlorodifluoromethane, and 44·5% trichloromonofluoromethane (manufactured by Pa Engineering Co., Philadelphia, Pa). The dispenser is fitted with a cap to which a needle valve with a can holder and hollow needle (Va Smelting Co., W. Norfolk, Va) is attached to release the sterilant mixture. The simple modification of the autoclave and drums is described, together with certain necessary precautions for use in practice. For effective sterilization materials heavily contaminated with resistant bacterial spores require an exposure to 300–500 mg. ethylene oxide/l. of air for 6 hr. at 25° C.

Bawden (F. C.). **Viruses : retrospect and prospect.**—*Proc. roy. Soc.*, B., **151**, pp. 157–168, 1959.

In this Leeuwenhoek Lecture, delivered on 18 June, 1959, the author summarized modern developments on the nature of the virus unit, the morphology of virus particles, and the infection process, and discussed transmissibility and pathogenicity.

Van der Veken (J. A.). **Some applications of freeze-drying in virological research.**—*Tijdschr. PlZiekt.*, **66**, 1, pp. 1–11, 1 diag., 1960. [Engl. summ.]

The process is described and discussed in relation to previous studies, and to the drying of (1) antisera, (2) diseased leaf material to preserve the activity of certain plant viruses or healthy foliage for the absorption of antisera, and (3) leaf material for the extraction of inhibiting substances in virus purification.

Gibbs (A. J.) & Gower (J. C.). **The use of a multiple-transfer method in plant virus transmission studies—some statistical points arising in the analysis of results.**—*Ann. appl. Biol.*, **48**, 1, pp. 75–83, 3 graphs, 1960.

A mathematical discussion from Rothamsted exp. Sta. of the properties of the max. likelihood estimator when used to evaluate experiments involving the multiple-transfer method [cf. **28**, 186]. The method is shown to be very reliable with a small proportion of infected samples but to lead to over-estimation as the proportion increases.

Kleczkowski (A.). **Effects of nonionizing radiation on plant viruses.**—*Ann. N.Y. Acad. Sci.*, **83**, 4, pp. 661–669, 1960.

This review from Rothamsted exp. Sta. is concerned principally with the kinetics of the inactivation of plant viruses by UV radiation [cf. **36**, 136], photoreactivation [**35**, 272], and the protection against UV radiation of virus nucleic acid by virus protein [cf. **37**, 112].

Kristensen (H. R.). **Plant virus diseases in Denmark—their incidence and control.**—*Curr. Sci.*, **29**, 4, pp. 124–127, 3 fig., 1960.

A brief review from Forest Res. Lab., Bangalore, India, giving a list, an outline of diagnostic work (infection experiments and serological investigations), spread and sources of infection, control measures, and diseases of horticultural plants, with a brief account of the activities of the National Committee for the Propagation and Sanitary Inspection of Horticultural Plants in respect of virus diseases in Denmark.

Klesser (Patricia J.). **Virus diseases of Lupins. Virus diseases of Cowpeas. Virus diseases of Peas and Sweet Peas. Virus diseases of Broad Beans.**—*Bothalia*, **7**,

2, pp. 207–231, 5 pl. (23 fig.); pp. 233 251, 3 pl. (19 fig.); pp. 253–282, 8 pl. (37 fig.); pp. 283–294, 2 pl. (10 fig.), 1960. [11, 45, 19, 32 ref.]

In each of this series of papers the literature is reviewed and the physical properties and host reactions of the viruses are detailed. The 5 naturally occurring viruses infecting lupin [cf. **39**, 290] in S. Africa are now named [**33**, 232], viz. bean yellow mosaic [**37**, 483] on *Lupinus albus* and *L. angustifolius*; pea mosaic virus 4 [bean yellow mosaic virus str.] on these 2 spp. and *L. affinis* and *L. luteus*, both viruses being found in the Pretoria district and Stellenbosch and both being 1st records of the virus in S. Africa; lupin virus A, possibly related to the bean yellow mosaic virus group, found on the 4 *L.* spp. and on *L. mutabilis*; lupin virus B, thought to be a new virus, occurring on *L. albus* and *L. angustifolius*; and lupin virus C, a distinct entity, but possibly related to B and occurring on the same 2 spp.

Detailed descriptions are given of 3 viruses, none of which is fully identical with any previously recorded virus or str., occurring in natural infections of cowpea [cf. **35**, 263 *et passim*] in S. Africa. One, designated cowpea mosaic virus A, causes stunting and small, malformed leaves with dark green veinbands or a mosaic with necrosis. It is transmitted by sap abrasion and by *Aphis craccivora*, and seems to be confined to the Leguminosae. The thermal inactivation point is 62–65° C., longevity *in vitro* 2–4 days, and the dilution end point 1:2,000. Cowpea mosaic virus B gives rise to only one field symptom, a dark green veinbanding, milder than that with virus A. Sap abrasion was successful, but results from insect transmission tests were inconclusive. This virus also is apparently confined to legumes. The thermal inactivation point is 60-62°, longevity *in vitro* 2–3 days, and dilution end point 1:1,000. The 3rd virus, a str. of cucumber mosaic [loc. cit.], causes severe stunting and a vivid yellow mottling.

Field peas in S. Africa are affected by 8 viruses: pea mosaic and pea virus 2 [str. of bean yellow mosaic virus], causing mosaic; tomato spotted wilt and a necrotic ring str. of lucerne mosaic virus differing from previously described strs., both causing necrosis and death; pea stunt virus [str. of bean yellow mosaic virus] inducing mosaic with necrotic stem streaks; and 2 other viruses considered very similar to, but not identical with, previously described viruses. A pea wilt virus str. differed from the type in longevity, dilution end point, and symptoms on certain minor hosts. A necrotic str. of bean yellow mosaic virus, isolated from sweet pea in the Pretoria district, differed from the type str. (found in England by the writer; Ph.D. thesis, Cambridge Univ., 1951) in that, *inter alia*, it did not infect cowpea, remained latent in sweet clover (*Melilotus officinalis*), and differed from Zaumeyer and Fisher's str. [**33**, 7] in infecting pea, white lupin, and crimson clover. Another virus, named bean local chlorosis virus B, is apparently a new entity, though previously described by the writer in England [loc. cit.]. It was isolated from sweet pea plants in the Pretoria district with small, puckered leaves exhibiting chlorotic veinbands or streaks, and causes vivid chlorotic spots on *Phaseolus vulgaris*.

Broad beans were infected by broad bean mosaic virus A and broad bean mosaic virus B, strs. of a virus that cannot be fully identified with any previously described, and which differ somewhat in host range, physical properties, and symptoms on some plants. These 2 viruses occur frequently and both cause a mosaic unusual in that the chlorotic areas are depressed.

A systemic necrosis of broad beans is caused by tomato spotted wilt virus.

Lister (R. M.). **Transmission of soil-borne viruses through seed.**—*Virology*, **10**, 4, pp. 547–549, 1960.

At the Scottish Horticultural Res. Inst., Mylnefield, Invergowrie by Dundee, seed transmission of tomato black ring was demonstrated in cowpea, soybean, strawberry, *Capsella bursa-pastoris*, *Senecio vulgaris*, and *Nicotiana rustica*; raspberry

ringspot [raspberry Scottish leaf curl] in soybean and strawberry; and arabis mosaic virus [**39**, 603] in soybean and petunia. Some of the parent plants were experimental plants inoculated as seedlings in the glasshouse, others were infected weeds collected from field outbreaks. The progeny were indexed on *Chenopodium amaranticolor*. The finding of seed transmission in *Senecio vulgaris* is of particular interest.

Further information is needed on the ecology and biology of the vectors of these viruses [**39**, 427] and on their occurrence in uncultivated soil before the importance of seed transmission in dispersal can be properly assessed. The present significance of these findings is in suggesting a more natural means of spread than has hitherto been put forward and in illustrating the danger of relying on the appearance of infection in weeds to indicate the presence of infective soil.

Thornberry (H. H.), Dale (J. L.), & Nene (Y. L.). **Effect of enzymes on infection of Bean leaves by Tobacco mosaic virus, Marmor tabaci, H.**—*Trans. Ill. Acad. Sci.*, **52**, 1–2, pp. 67–71, 1959.

Scotia bean plants (*Phaseolus vulgaris*) were used in most of these tests [cf. **36**, 451] and the virus inoculum, a partially purified preparation normally giving 50 lesions leaf, was treated at pH 4·5, 6, and 8·5 with one or other of 48 widely different enzymes. Halves of opposite leaves were inoculated with treated and non-treated virus and washed with tap water soon afterwards. From the tabulated results it seems unlikely that specific and generally recognized enzymatic reactions of a chemical nature are involved in the mechanism of inhibition. Non-specific physical alteration of the surface of the virus or of the injured cell seems likely.

Porter (C. A.) & Weinstein (L. H.). **Altered biochemical patterns induced in Tobacco by Cucumber mosaic virus infection, by thiouracil, and by their interaction.**—*Contr. Boyce Thompson Inst.*, **20**, 5, pp. 307–315, 1960. [15 ref.]

In further work [cf. **37**, 218] Vamoor 48 tobacco plants were inoculated with cucumber mosaic virus and grown in nutrient solution with or without 5 p.p.m. thiouracil [cf. **38**, 279], the leaves subsequently (at 0, 72, 230, and 286 hr.) being analysed for proteins, free amino acids and amides, nucleic acids, and malic and citric acids. Thiouracil, alone or in combination with virus infection, caused decreases in all constituents except the free amino and amide N pool, the increase in which was relatively large and attributable primarily to inhibition of protein synthesis, rather than to proteolysis. These and other data substantiate earlier conclusions that thiouracil interferes with protein and nucleic acid metabolism in tobacco, without materially impairing the synthesis of amino acids.

Costa (A. S.) & Carvalho (Ana M. B.). **Comparative studies between Abutilon and Euphorbia mosaic viruses.** *Phytopath. Z.*, **38**, 2, pp. 129–152, 10 fig., 1960. [Germ. summ.]

Further studies at the Inst. agronomico, Campinas, Brazil [**39**, 465], revealed that white flies (*Bemisia tabaci*) bred on *Euphorbia prunifolia* or on *Sida* spp. were able to pick up and transmit both viruses, euphorbia mosaic virus (EMV) [**29**, 493] being more efficiently transmitted than abutilon mosaic [abutilon infectious variegation: **35**, 184] virus (AMV). Individual insects were able to carry the 2 simultaneously. Comparative host range tests showed that tobacco plants were more resistant to EMV than to AMV. When infected they developed symptoms like those of tobacco leaf curl, but without leaf enations. Upland cotton (*Gossypium hirsutum*) developed yellow mosaic when infected with AMV while *G. barbadense* vars. were comparatively resistant, Tanguis being the most susceptible; when infected they showed the same symptoms as *G. hirsutum*. Plants of both spp. developed necrotic markings where white flies carrying EMV fed. Systemic invasion

was not recorded. EMV was transmitted more easily than AMV by mechanical means. *Datura stramonium* is a local lesion test plant for the former, while *Malva parviflora* and *Nicotiana glutinosa* proved good test plants for the latter. The physical properties of both viruses *in vitro* were remarkably similar, but though they may be related the evidence indicates that they are not identical.

Thresh (J. M.) & Lister (R. M.). **Coppicing experiments on the spread and control of Cacao swollen-shoot disease in Nigeria.**—*Ann. appl. Biol.*, **48**, 1, pp. 65–74, 2 graphs, 1960. [27 ref.]

A coppicing technique was used in studies at the W. African Cocoa Research Inst., Nigerian Sub-Station, Ibadan, to determine the incidence and distribution of latent and unrecognized infection round naturally occurring outbreaks of cacao swollen shoot virus [cf. **38**, 360; **39**, 96] in Western Nigeria. All the apparently healthy trees within 30 yd. of 80 outbreaks on peasant farms were coppiced, and most of the infected stumps which regenerated (about half is the general rule) developed visible symptoms within 1 yr. The distribution of the infected stumps round 35 outbreaks is expressed by the equation $\log_{10} I = a+bx$ [**29**, 348], where I is the estimated intensity of infection in the coppiced stumps at a distance x from the nearest infected tree removed at coppicing. The constant a determines the height of the peak of the infection gradient and increases with size of outbreak, while the slope of the gradient, determined by the negative constant b, is similar round all outbreaks.

The results were consistent with the information available on the movement of mealybugs (*Pseudococcus njalensis*) and the spread of the virus in outbreaks. They also indicate that outbreaks are controlled most economically by removing all obviously diseased trees and the adjacent, apparently healthy, ones within 5, 10, and 15 yd. of outbreaks containing 1–5, 6–50, and 51–200 infected trees, respectively. It is not necessary to destroy trees up to 30 yd. from an outbreak.

Murray (D. B.) & Swarbrick (J. T.). **Heat treatment of Cacao budwood with reference to Cacao virus.**—*Rep. Cacao Res. Trinidad, 1957–8*, pp. 65–66, 1959.

Attempts to eliminate str. B of Trinidad cacao virus [**23**, 379; **26**, 538] from planting material of the clone ICS 95 by heat treatment were unsuccessful, no inactivation of the virus occurring with treatments at the limits of heat tolerance [cf. Thresh, **38**, 75].

Dudman (W. F.) & Nichols (R.). **Examination of culture filtrates of Marasmius perniciosus Stahel for gibberellin-like substances.**—*Rep. Cacao Res. Trinidad, 1957–8*, p. 48, 1959.

The negative results of an experiment in which extract from freshly collected cacao witches' broom material, macerated in a Waring blender with a little water, filtered, and evaporated in a freeze drier, was applied just below the apex of cacao seedlings (some being pricked subsequently) eliminated the further possibility that *M. perniciosus* might produce gibberellin-like substances *in vivo* [**38**, 681].

Bartley (B. G. D.). **The efficiency of a test of the resistance of Cacao seedlings to Marasmius perniciosus Stahel.**—*Rep. Cacao Res. Trinidad, 1957–8*, pp. 49–52, 1959.

A more detailed account of information already noticed [**39**, 401].

Bartley (B. G. D.) & Iton (E. F.). **A note on the infection of Herrania species by Marasmius perniciosus Stahel.**—*Rep. Cacao Res. Trinidad, 1957–8*, pp. 53–54, 2 fig., 1959.

Natural vegetative and floral infection of *H. albiflora*, *H. purpurea*, and *H. nitida*

and floral infection of some hybrids in the *Herrania* collection at River Estate is recorded. Mycelium was found in the fruits of *H. albiflora*. It is of interest that the first 2 spp. occur naturally in areas where there has been no previous record of the fungus.

ITON (E. F.). **Studies on a wilt disease of Cacao at River Estate.**—*Rep. Cacao Res. Trinidad, 1957–8*, pp. 55–64, 7 fig., 2 maps, 1959.

In this report of the symptoms of a natural outbreak of wilt disease (*Ceratostomella* [*Ceratocystis*] *fimbriata*) [cf. **38**, 587; **39**, 563] in experimental cacao plantings the extent of the wilting is related to the siting of the borings of *Xyleborus* spp. When the 'shot-holes' are on the root or trunk the whole tree dies, while borings restricted to the branches are associated with the death of the infested branches only. Apparently symptom expression occurs only distal to the site of infection. The discoloration of bark and wood is somewhat variable and is accompanied by a smell reminiscent of sardines. It is not known whether the fungus precedes the beetle, or *vice versa*. It seems possible that *Xyleborus* may be an effective short-range vector of the disease and wind-blown insects may cause wider spread. Crosses with KS 45, 54, or 101 as parent appear to be very susceptible, those with ICS 1 parentage are suspect, and those with ICS 95 and 98 more resistant. The distribution of the disease in Trinidad is mapped.

TURNER (P. D.). **Distribution of strains of Phytophthora palmivora from Theobroma cacao in West Africa.** *F.A.O. Pl. Prot. Bull.*, **8**, 5, pp. 53–54, 1960.

Further studies at the W. Afr. Cocoa Res. Inst., Ghana, showed that distinct strs. of *P. palmivora* [cf. **39**, 402, *et passim*] are present in W. Africa and that their distribution follows a definite geographical pattern. There were 2 main groups of isolates, 'cacao' and 'rubber' [**4**, 65; cf. **38**, 467], which were sexually complementary. The 3rd (small) group was complementary to neither of the other 2 and resembled the description of the 'atypical' group [**8**, 526]. With the exception of 2 atypical isolates from Sierra Leone, all isolates from countries W. of Dahomey (which does not grow cacao), i.e. Ghana, Ivory Coast, and Sierra Leone and occasionally from Nigeria and Southern Cameroon, belonged to the 'cacao' group. Those from the more easterly countries, Nigeria, Southern Cameroon, Fernando Po, and Cameroun [French Cameroons] were of the 'rubber' group. Isolates from Gabon were of both groups; a single isolate from the Belgian Congo was 'cacao' and one from Angola 'atypical'.

The strs. differed strongly in all the characters examined. 'Cacao' isolates developed more rapidly in cacao pods, especially unripe ones, and the lesions produced were easily distinguished. Sporangial length : width ratio was an important diagnostic character, the av. ratio for 'cacao' and 'atypical' isolates being 1·7 and for 'rubber' isolates 1·3.

[This information also appears in *Nature, Lond.*, **186**, 4723, pp. 495–496, 1960.]

BUTLER (F. C.), GRYLLS (N. E.), & GOODCHILD (D. J.). **The occurrence of Barley yellow dwarf virus in New South Wales.** *J. Aust. Inst. agric. Sci.*, **26**, 1, pp. 57–59, 2 fig., 1960.

When barley yellow dwarf virus [cf. **39**, 298, *et passim*] was 1st reported from N.S.W. in 1956 in wheat and oat var. trial plots (*Commonw. phytopath. News*, **3**, 1, p. 10, 1957) it was identified from symptoms; transmission tests have now confirmed its presence. It was first observed in commercial cereal crops in the winter of 1959 in southern N.S.W., being noted initially in a 54-acre crop of Belar oats near Wagga Wagga, and then in neighbouring wheat crops and in oats and wheat elsewhere.

It did not cause serious damage except in 1 oat crop in which infection increased progressively from 8–10% in mid-July to an estimated 50% by late Aug., occurring

in semi-circular patches in association with *Rhopalosiphum padi*. In these patches the plants were very stunted, with older leaves yellow to orange, often with a deep reddish-purple pigmentation. A characteristic longitudinal chlorotic striping was common in younger leaves, many of which were serrated at the edges. Some of the infected earliest plants died and of the remainder some failed to head and others produced panicles with many blasted florets. A similar pattern of infection was observed in wheat. Both *R. padi* and *R. maidis* were found in infected wheat and oat crops, and *Macrosiphum avenae* s.sp. *miscanthi* was also associated. *R. padi* was the aphid most commonly encountered in the field, where it was present also on *Hordeum leporinum* and *Lolium rigidum*.

Roland (G.). **Note préliminaire sur une virose des céréales.** [A preliminary note on a virosis of cereals.]—*Parasitica*, **16**, 2, pp. 62–65, 1 fig., 1960.

Evidence is presented from the Station de Phytopathologie de l'État, Gembloux, of the 1st recorded occurrence of barley yellow dwarf virus [map 332] in Belgium, on barley in Dec. 1959, identified by symptoms and by aphid transmissions in the greenhouse.

Fitzgerald (P. J.) & Timian (R. G.). **Effect of Barley stripe mosaic on Wheat.**—*Plant Dis. Reptr*, **44**, 5, pp. 359–361, 1960.

At U.S. Dept Agric. and Idaho and N. Dak. agric. Exp. Sta. yields of plants from infected seed of winter wheat plants obtained by inoculating the parent plants with sap from infected barley [**39**, 566] were reduced on an av. by almost 19% (13·4–25·9) in winter wheat vars. Wasatch, Cache, Turkey, Columbia, and Itana [cf. **37**, 34], compared with 32·8% in 8 vars. of spring wheat [**37**, 467] and 31% in barley [**32**, 674]. With close row spacing (2 in.) and periodic air movement (by fan) in the greenhouse transmission of the virus took place from Manchuria barley and Wasatch winter wheat to Stewart durum spring wheat, Lee hard red spring wheat, and Manchuria barley. In the field a 27% level of infection was obtained in disease-free plants of Wasatch and Cache wheat from diseased Trebi barley sown in the same row. The fact that no infection was noticed in the seed from healthy rows 12 in. from diseased indicates either that at a later stage, when leaf contact is possible, the plants are resistant, or that virus transfer occurs then, but the kernels are not invaded.

Hagborg (W. A. F.) & Chelack (W. S.). **Whey as an inhibitor of stripe mosaic of Barley.**—*Canad. J. Bot.*, **38**, 2, pp. 111–116, 1 pl., 1960.

At the Canada Dept Agric. Res. Sta., Winnipeg, applications of whole milk and of whey to barley stripe mosaic virus inoculum or to Plush barley plants before inoculation in the greenhouse strongly inhibited contact transmission of the virus [cf. **38**, 543]. Sprayings with skimmed milk or whey reduced virus spread in the field. The low cost of whey should make it useful in commercial control of barley stripe mosaic virus.

Machacek (J. E.) & Wallace (H. A. H.). **Co-operative seed treatment trials—1959.**—*Plant Dis. Reptr*, **44**, 4, pp. 290–293, 1960.

In these annual tests by Canada Dept Agric., Winnipeg [cf. **38**, 588], 48 chemicals were assayed against wheat bunt (*Tilletia foetida* and *T. caries*), oat smut (*Ustilago avenae* and *U. kolleri* [*U. hordei*]), covered smut of barley (*U. hordei*), and seed rot of flax. The results are tabulated.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **8**, 4, pp. 46–47, 1960.

Elizabeth G. Gray (N. Scotland Coll. Agric., Aberdeen) and Mary Noble (Dept Agric. Scotland, Edinburgh) report that *Cephalosporium gramineum* [**38**, 496] was 1st observed in Scotland in 1952 on a few plants of wheat and barley in plots at

Sci. Services, Dept Agric., Edinburgh. It was found on a field scale in 1955 on Cappelle Desprez wheat in Kincardineshire and Aberdeenshire. Since then there have been frequent records of its occasional appearance on wheat, oats, and barley, but in Apr. 1959 it occurred on a field scale in E. Lothian on seedling barley. In wheat, especially Cappelle Desprez, affected plants are about half the normal size with vivid yellow and pale green stripes running the whole length of the leaves, corresponding areas of blackened tissue being present within the nodes. Many infected plants are later attacked by *Fusarium roseum* and die. In barley and oats striping and dwarfing are less conspicuous. The fungus was not isolated from seed of affected plants [cf. **37**, 276].

Levine (M. N.) & Basile (Rita). **A review and appraisal of thirty years' research on cereal uredinology in Italy.** — *Boll. Staz. Pat. veg., Roma*, Ser. 3, **17** (*1959*), 1, pp. 1–32, 1 col. pl., 1960. [Ital. summ. 36 ref.]

This paper reviews the work done in Italy on cereal rusts 1927–56 with special reference to the parasitic specialization of the wheat rusts *Puccinia graminis* [f.sp.] *tritici* [cf. below] and *P. recondita* [cf. **38**, 252]. The matters covered include the races isolated and identified by Italian workers and the frequency of races in various countries. Attention is drawn to the remarkably large number of races in Italy, which appear to show greater affinity with those of Israel than elsewhere. The authors make a strong plea for regional and international co-operation in cereal rust research and make a number of suggestions regarding uredinological terminology, host reaction, and rust infection classifications, a method of determining infection means for particular items, a simplification of the diagnostic keys, and a formula for estimating the no. of races of any given rust that it is possible to isolate in theory and in practice.

Basile (Rita), Leonori-Ossicini (Agnese), & Zitelli (Giuseppina). **Razze fisiologiche di ruggine nera del Frumento (P. graminis var. tritici) identificate in Italia nel 1958.** [Physiologic races of Wheat stem rust (*P. graminis* f.sp. *tritici*) identified in Italy in 1958.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **17** (*1959*), 1, pp. 37–44, 1 graph, 1960. [Engl. summ. 15 ref.]

In all, 33 races of stem rust [cf. **38**, 252; **39**, 295] were identified from 100 isolates. Incidence of race 34 is increasing and that of race 21 declining. Among the most important races (in decreasing order of percentage prevalence) were 75, 11, 14, 17, 133, and 186. What is probably a new race is provisionally designated R 50.

Mohamed (H. A.). **Survival of stem rust urediospores on dry foliage of Wheat.**— *Phytopathology*, **50**, 5, pp. 400–401, 1 graph, 1960.

At Inst. Agric., Univ. Minn., St. Paul, dry foliage of Marquis and Little Club wheat, 7 days old, was dusted with uredospores of race 139 B of *Puccinia graminis* in talc; the pots were subirrigated to prevent the leaves from getting wet. Immediately, and every day, 1 pot of each var. was sprayed with water in a moist chamber and returned 12 hr. later to the greenhouse. The number of infection centres developing after 14 days on both vars. dropped after 4 dry days, then rose again, and dropped finally to nearly nil on Little Club after the 6th day and on Marquis after the 7th. Although further traces of infection occurred, after 11 dry days all spores had lost viability.

Naumova (Mme N. A.). Определение жизнеспособности уредоспор **Puccinia glumarum Erikss. et Henn.** люминесцентным методом. [Determination of the viability of uredospores of *P. striiformis* by the luminescence method.] — *C. R. Acad. Sci. U.R.S.S.*, **131**, 5, pp. 1194–1197, 1960.

Uredospores from a susceptible wheat var. [**39**, 16] were stored dry in darkness at 10–20° [C.]. Samples were examined in water at intervals. Fresh uredospores,

both young and old, were golden yellow under the light microscope, but fluoresced dun (young) or dirty green (old) under UV, while the wall fluoresced yellow. Fluorescence varied according to the UV source and the light filters used. Spores retained their normal colour after 20 days' storage, though some differing in the colour or tone of fluorescence could be distinguished. They faded or became colourless (10%) after 71 days, the latter fluorescing bluish-green. The no. of colourless spores increased as the storage period lengthened (83, 103, and 120 days), 96% being whitish after 300 days in normal light. After 437–472 days all spores were colourless. Fresh mature spores caused 80–100% leaf infection on wheat, but after 20 days' storage infected only 10–20%. Luminescence methods might be used in studying the minute physiological, cytological, and biochemical processes taking place in spores. In view of the weak fluorescence of uredospores, new spores were stained with fluorochromes, the best results being obtained with fluorochrome 1:1,000 and 25 min. exposure. With acridine orange living spores luminesced green and dead spores red.

Polyakov (I. M.), Lyuboshits (I. L.), & Klaptsova (Mme N. K.). Новый метод сушки зерна в борьбе с пыльной головней. [A new method of drying seed to control loose smut.] –Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 6, pp. 16–18, 1 fig., 1960.

Loose smut [*Ustilago nuda*] and rust [*Puccinia* sp.] on the wheat vars. Mil'turum and Belorusskaya 15 were effectively controlled by seed treatment with rodan followed by drying in a Lyuboshits' desiccator constructed in the Inst. Energetiki, Acad. Sci. of the Belorussian S.S.R. In this appliance seed is made to pass through a pipe filled with chimney gas and air at 150° C. for 2–3 sec. and subsequently transferred into an air-cooling chamber, which procedure is repeated for about 1 hr. This method, which did not affect the viability or the nutritive value of the seeds, caused a decrease in smut and rust incidence from, respectively, 0·13 and 22% (ordinary kiln drying at 60°) to 0·03 and 8%. When water was substituted for rodan before desiccation incidence was 0·26 and 21%, compared with 0·75 and 28% in untreated seed; if rodan was used the percentages were 0·04 and 9.

Rŷzneĭ (I. P.). Селекция Пшеницы на устойчивость к пыльной головне. [Wheat selection for loose smut resistance.] –*Agrobiology, Moscow, 1960*, 2, pp. 232–236, 1960.

In 1956–58 flowering in wheat was studied at the Kirghiz sci. res. Inst. for Agric. in relation to smut infection [*Ustilago nuda*: **39**, 466]. Susceptible vars., such as Nigriaristatum 3, are those with open inflorescences, in which the glumes are open for a longer time [cf. **39**, 564, 693]. Vars., however, in which the closed type of inflorescence predominates, and glumes are only open for a very short period (3–6 min. approx.), are resistant, or only mildly susceptible, such as Erythrospermum 115-a. Selection on the basis of closed inflorescences can sharply reduce the period during which the glumes are open and increase the degree of closed flowering. By selecting seed from closed flowered inflorescences it was possible to free the selection material from *U. nuda* and also to make infected vars. healthy again. No special observations are needed for selection on the basis of closed inflorescences. There are always dry pollen grains on the apical glumes in grain formed in closed flowers, which are absent in grain formed in open flowers. The grain in the latter is clean.

Rod (J.) & Řídký (K.). **Geneticko-fyziologická studie rezistence Pšenice proti sněti prašné. IV. Pokus o 'biologické moření'.** [Genetico-physiological study of the resistance of Wheat to loose smut. IV. Experiment in 'biological treatment'.] –*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 211–226, 1960. [Russ., Germ. summ.]

In studies on the control of *Ustilago tritici* [*U. nuda*] [cf. **30**, 31] at Res. Inst. of

Grass Field System, Pohořelice, Czechoslovakia, dipping healthy seed in an extract from the mycelium of *Psalliota* [*Agaricus*] *campestris* stimulated germination at lower, but inhibited it at higher concs., whereas infected seed dipped in water or extract yielded more plants with fewer ears than non-dipped seed. Dips in an extract from mushroom compost reduced the viability of healthy seed but increased the yield from infected seed. Treatment in cow or horse manure suspension (1:1) slightly affected the viability of healthy seed and reduced the number of mature plants from infected seed, largely eliminating infection.

Marshall (Gillian M.). **The incidence of certain seed-borne diseases in commercial seed samples. IV. Bunt of Wheat, Tilletia caries (DC.) Tul. V. Earcockles of Wheat, Anguina tritici (Stein.) Filipjev.**—*Ann. appl. Biol.*, **48**, 1, pp. 34–38, 1960.

Samples of commercial wheat seed submitted to the Official Seed Testing Station, Cambridge, from 1918 to 1957 were examined for the presence of bunt balls and earcockles. The highest proportion of contaminated samples was found in 1921, when 33% contained bunt balls and 9% earcockles. Since then, incidence has fallen and is now steady, with under 1% containing bunt balls and under 0·1% earcockles. In 1957 no bunt spores were found in 122 samples.

Zaleski (K.) & Grela (T.). **Względna odporność 15 odmian Pszenicy ozimej, uprawianych w Polsce, na śnieć Pszenicy (Tilletia tritici [Bjerk.] Winter). Doświadczenia polowe z lat 1950/51.** [The relative resistance of 15 winter Wheat vars. cultivated in Poland to Wheat bunt (*T. caries*). Field experiments during 1950–51.] *Prace Kom. Nauk roln. leśn. Poznań*, **5**, 4, pp. 185–203, 1959. [34 ref. Engl. summ.]

At the Inst. of Plant Prot., Gorzów Wielkopolski, var. Biała Kleszczewska proved highly resistant to *T. caries* [**38**, 508] (plants from inoculated seed 2% infection, non-inoculated 0·1%). Antonińska Wczesna was moderately resistant (9·1, 1·4), Biały Krzyż and Kujawianka Więcławicka were moderately susceptible (13·1, 0·3 and 18·4, 0·1), and the other vars. highly susceptible. As the most resistant vars. were low yielding and their cultivation does not provide sufficient control, seed treatment is recommended.

Kachalova (Mme Z. P.). Влияние обработки семян антибиотиками на пораженность Пшеницы твердой головней. [Effect of seed treatment with antibiotics on hard bunt infection of Wheat.] *Proc. Timiryazev agric. Acad.*, *1959*, 48, pp. 97–103, 1959.

At this Academy, Moscow, pre-sowing seed treatment of the winter var. Moskovskaya 2453 with penicillin at 100 units ml. reduced the incidence of *Tilletia tritici* [*T. caries*: **38**, 738] from 23·3 to 15·1% and increased the yield by 17·1%. An analogous application of the extract from the green leaves of wheat at 1:5 diminished bunt infection from 9·3 to 2·8%, but hampered growth and reduced yield by < 2·9%. Chlamydospores mixed with quartz sand at 1:100–200 appeared to have an antibiotic effect, stimulating growth of plants started as seedlings in this sand by 73–84% in *Triticum fungicidum*, 88% in Moskovka, 50% in 15/17, and 40% in 5/5; also the activity of catalase and peroxydase was enhanced, and infection of the ears of Lutescens 62 and Moskovka was eliminated. Extracts from the chlamydospores gave negative or inferior results.

Graham (S. O.). **The effects of various reagents, mounting media, and dyes on the teliospore walls of Tilletia contraversa Kühn.** *Mycologia*, **51** (*1959*), 4, pp. 477–491, 4 fig., 1960.

Shear's fluid proved the best of several reagents tested at Wash. State Univ.,

Pullman, giving clearer mounts with less distortion; variability in pH was overcome by making up the fluid with pH 8 McIlvaine's buffer. As a standard procedure for taxonomic studies on smuts, warming in 2 drops of a mounting fluid containing 300 ml. 2% potassium acetate in pH 8 McIlvaine's buffer (0·2 M), 120 ml. glycerin, and 180 ml. 95% ethyl alcohol is recommended. For semi-permanent mounts Chupp's double-coverslip method [**20**, 269] is recommended. To secure uniform dye uptake by smut spores in aqueous mounts they should be leached in ether or some other highly volatile lipoid solvent. Several staining procedures and dye combinations are suggested to differentiate wall structures. An oil-containing 'mesospore', however, could be defined only in non-ether-leached spores.

Simmonds (P. M.). **Infection of Wheat with Helminthosporium sativum in relation to the nitrogen content of the plant tissues.**—*Canad. J. Pl. Sci.*, **40**, 1, pp. 139–145, 1 pl., 1960.

At the Canada Dept Agric., Saskatoon, inoculation of the lower half of a detached wheat leaf with *H. sativum* [*Cochliobolus sativus*: **38**, 687] produced variable degrees of chlorosis in the uninvaded half and retention and accumulation of N in the invaded part, which retained its green colour. Leaching readily removed N from the affected tissue. Inoculation of culms at flowering resulted in an increase of low N kernels. It is suggested that interception of N by the pathogen takes place, possibly reducing protein and affecting the grain.

Semeniuk (G.) & Henry (A. W.). **Relative decline of Ophiobolus graminis, Helminthosporium sativum and Fusarium culmorum in the soil.**—*Canad. J. Pl. Sci.*, **40**, 2, pp. 288–294, 3 graphs, 1960. [18 ref.]

In the Dept Plant Sci., Univ. Alta, Edmonton, the decline of the cereal root pathogens *O. graminis*, *H. sativum* [*Cochliobolus sativus*], and *F. culmorum* [cf. **38**, 509] was compared in natural and sterilized black loam soil using inoculum from soil-cornmeal cultures. In 3–4 weeks all three fungi had virtually disappeared, the amount of effective inoculum remaining being directly measurable by the severity of infection produced in test wheat seedlings. *F. culmorum* declined most rapidly and *O. graminis* least. With the exception of *F. culmorum* the decline rate was similar in both soils. It was concluded that the decline was a degenerating process resulting from the activity of soil micro-organisms.

Ledingham (R. J.), Sallans (B. J.), & Wenhardt (A.). **Influence of cultural practices on incidence of common rootrot in Wheat in Saskatchewan.**—*Canad. J. Pl. Sci.*, **40**, 2, pp. 310–316, 1960.

In a comparative field study at the exp. Farm, Swift Current, Sask., from 1951 to 1958, ploughing was more effective than surface tillage in reducing the incidence of root rot (*Helminthosporium sativum*) [*Cochliobolus sativus*: see above] in seedling wheat in a second consecutive crop. At maturity, however, crop differences in the two treatments had disappeared and it was concluded that in general yields were not significantly increased by ploughing.

Tinline (R. D.), Stauffer (J. F.), & Dickson (J. G.). **Cochliobolus sativus. III. Effect of ultraviolet light.**—*Canad. J. Bot.*, **38**, 3, pp. 275–282, 3 pl., 2 graphs, 1960. [22 ref.]

In further studies [cf. **39**, 86] conidia of a dark-spored strain of *C. sativus* were considerably more resistant to high doses of radiation than those of a white spored strain. UV increased the frequency of mutation, the mutants differing from the original culture in degree of sporulation, rate of growth, pigmentation, amount of aerial mycelium, topography and consistency of colony, and pathogenicity to wheat

seedlings. Tetrads from crosses between weakly and highly pathogenic strs. indicated that pathogenicity was not a clearly segregating character.

Košťál (Z.). **Příspěvek k poznání některých morfologických a fyziologických vlastností houby Helminthosporium sativum P.K. a B.** [Contribution to the knowledge of some morphological and physiological properties of the fungus *Cochliobolus sativus*.] *Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 195–204, 2 pl., 2 graphs, 1960. [22 ref.; Russ., Germ. summ.]

Influence of temp., humidity, pH. and nutrition on the rate of growth and conidial dimensions was studied at the Central Control and Exp. agric. Inst., Prague. Inoculations in the glasshouse showed that a 12 hr. dip of barley and wheat seed in a 250,000 ml. conidial suspension entailed an av. delay in emergence of 2 and 3 days, respectively, and a 24 hr. dip a reduction in germination to 70 and 67%, respectively. Young plants of barley, wheat, rye, maize and some fodder grasses were infected by 600,000 ml. if the initial humidity of air was sufficient. Soil treated with conc. suspension caused infection, with 3–4 days' delay in emergence and a 50% reduction in germination in barley. A 100% control of inoculated seed was obtained by agrostan and dektosal (both containing cresolmercuricyanide) at 0·5 [cf. **37**, 758], [copper] sandoz at 0·4, and ziram at 0·3%.

Papavizas (G. C.) & Christensen (C. M.). **Grain storage studies. XXIX. Effect of invasion by individual species and mixtures of species of Aspergillus upon germination and development of discolored germs in Wheat.**—*Cereal Chem.*, **37**, 2, pp. 197–203, 1 graph, 1960.

At Minn. agric. Exp. Sta., St. Paul, wheat samples were surface-disinfected and inoculated with spores of *A. amstelodami*, *A. ruber*, *A. restrictus*, and *A. candidus*, singly and combined, stored at 25° C. and 75, 80, and 85% R.H. (14·7–14·9, 16–16·4, and 17–17·2% moisture contents, respectively), and tested after 1–5 months for germination, discoloured germs, and numbers and kinds of moulds [cf. **39**, 20]. Mixtures did not cause greater reduction of germination or more germ damage than did the use of the most pathogenic fungi alone.

In wheat samples inoculated with spores of *A. amstelodami* and *A. candidus*, damage after 3 months' storage at 25° and 80% R.H. was more extensive in the hard red winter and white than in durum and hard red spring. Thus, germination in hard red winter infected by *A. amstelodami* fell from 80 to 23%, while the number of dark germs rose from 6 to 60%, the corresponding figures for *A. candidus* being 17 and 73%; figures for white samples were 45 and 6% germination for the 2 spp. respectively (controls 95%), and 31 and 79% discoloured germs (uninoculated nil); for durum 65 and 45 (87) and 16 and 21 (6); and for hard red spring 42 and 32 (88) and 25 and 57 (2)%.

Golubchuk (M.), Cuendet (L. S.), & Geddes (W. F.). **Grain storage studies. XXX. Chitin content of Wheat as an index of mold contamination and Wheat deterioration.**—*Cereal Chem.*, **37**, 3, pp. 405–411, 1960.

At Minn. agric. Exp. Sta., St. Paul, fungus chitin was determined in hydrolysed crude fibre preparations from 9 hard red spring wheat samples with varying degrees of [unspecified] mould contamination [cf. above] by the colorimetric procedure of Elson and Morgan (*Biochem. J.*, **27**, pp. 1824–1828, 1933) and a modification of Tracey's alkaline decomposition method (*ibid.*, pp. 265–267, 1952). The relative results were the same by both methods, but the latter gave higher values with a higher experimental error. The mean chitin values (expressed as glucosamine) for the 2 methods ranged from 18 to 393 p.p.m. dry basis for the different samples. Wheats of low mould count, low fat acidity, and high viability yielded glucosamine values of 18–55 p.p.m., whereas the corresponding levels for 2 samples of Marquis

stored at 25% moisture for 30 days at 24° C., with mould counts of 8,800 and 400,000 spores/g., high fat acidity, and zero viability, were 214 and 393 p.p.m., respectively.

It is concluded that the determination of chitin content is a promising approach to the evaluation of incipient grain deterioration, but for routine application the analytical procedures would have to be simplified and their replicability improved.

Khrushcheva (Mme E. P.). Микориза Пшеницы и её значение для роста и развития растения. [Wheat mycorrhiza and its importance for the growth and development of the plant.]—*Bull. Acad. Sci. U.R.S.S.*, *1960*, 2, pp. 230–239, 1960. [Engl. summ.]

At the agric. Inst., Gorkiĭ, *Fusarium oxysporum* was shown to be one of the mycorrhizal fungi on wheat [cf. **34**, 666] in light grey forest-steppe soils. In a recently ploughed soil, formerly under perennial grasses, with a herbage yield of 30–40 centners/ha., and no fertilizers or only N introduced under the cultivator, all hard and soft wheat plants become mycotrophic, whereas with large doses of mineral fertilizers and early ploughing, 16% had no mycorrhiza. The availability of soluble carbohydrates in the root system is important for mycorrhizal development, which is inhibited by reduced light intensity and by the use of carbohydrates for protein synthesis in the presence of P and N. Mycorrhizal summer wheat is distinguished by a higher sugar content in roots, a lower oxidation-reduction potential, and higher water and P requirements. Mycorrhiza improve growth and development of wheat under good cultivation, but introduction of cultures is unnecessary, since cultivated soils have an adequate supply of mycorrhizal fungi.

Staněk (M.) & Ujević (I.). **Výskyt bakteriové skvrnitosti listů ve skleníkových kulturách Pšenice a Ječmene vyvolané bakterií Pseudomonas atrofaciens (McCulloch) Stevens a způsob ochrany rostlin proti ní.** [The occurrence of bacterial leaf spot in glasshouse Wheat and Barley crops caused by *P. atrofaciens*, and means for protecting plants against it.]—*Ann. Acad. tchécosl. Agric.*, **32**, 3, pp. 345–356, 1959. [Russ., Germ., Engl. summ. Abs. in *Referat. Zh. Biol.*, *1960*, 4, p. 185, 1960.]

From diseased wheat and barley grown in winter in glasshouses for experimental purposes at the Inst. for Plant Growing, Ruzyně (Prague), 4 strs. of *P. atrofaciens* [map 369] were isolated. Inhibition on barley was obtained by spraying with phytostreptom (a combination of streptomycin and terramycin 10:1·14%) and by combined seed steeping and spraying with a 0·2% solution. Disease development was stimulated by a 0·05% spray.

Russell (R. C.). **Observations on cereal embryos in relation to the 'embryo test' for loose smut.**—*Canad. J. Bot.*, **38**, 2, pp. 251–257, 3 pl. (18 fig.), 1 fig., 1960.

Investigation of whole barley embryos at the Canada Agric. Res. Sta., Saskatoon, separated by a modification of Simmonds' method [**25**, 258; cf. below], revealed dormant mycelium of *Ustilago nuda*, which appeared as brown threads mainly in the surface tissue of the scutellum [cf. **37**, 653]. Frost occurring during the later development of the kernel caused stunting of the embryo, particularly the coleoptile, and formation of yellowish-brown pigment particles in the embryo tissue. Other abnormalities were lobulate outgrowths of unknown origin at the margin of the scutellum and bright yellow specks in the scutellum. In tissues which were incompletely dehydrated because the embryos were removed from alcohol too soon a condition known as 'black specks' sometimes developed.

Morton (D. J.). **A quick method of preparing Barley embryos for loose smut examination.**—*Phytopathology*, **50**, 4, pp. 270–272, 1960.

In this 90-min. method [cf. **38**, 318] described from N. Dak. agric. Coll., Fargo,

600–700 barley kernels are boiled to a gelatinous mass in 500 ml. water with 25 g. NaOH + 70 ml. commercial Na silicate + a drop of detergent. This is poured, hot, on to a superimposed series of screens of 4, 6, 8, and 14 meshes/sq. in. Warm water, sprayed gently on the mass, carries embryos and lighter hulls to the lowest screen. The embryos are then separated by centrifuging (International Clinical Centrifuge, 4,500 r.p.m.) in 50% aqueous Na silicate, when they form a surface layer. They are washed in 2 changes of water and cleared in boiling lactophenol for 10 min. Under a 15 × dissecting microscope the mycelium of *Ustilago nuda* can be seen clearly as a reddish-brown network [cf. above].

Malik (M. M. S.) & Batts (C. C. V.). **The determination of the reaction of Barley varieties to loose smut.** —*Ann. appl. Biol.*, **48**, 1, pp. 39–50, 1 graph, 1 diag., 1960. [23 ref.]

At Imperial Coll., London, the inoculation of barley with *Ustilago nuda* by means of various techniques gave results which did not reflect the known behaviour of the vars. under natural conditions. No consistent results were obtained, but all the vars. became infected. In the field some must escape infection [cf. **39**, 564, 688], and the inoculation technique must have overcome the escape mechanism.

Drops of water coloured with malachite green or of a spore suspension were allowed to fall from a height (5·3 m. on to potted plants in the lab. and 3 m. in the field) on to barley ears at anthesis. Although this increased infection slightly in some vars. grains on the ears of vars. which do not become infected in the field did not become coloured or infected in these tests, whereas the grains of vars. susceptible in the field did. The glumes of the former group remained closed, preventing the access of smut spores under natural conditions. Similarly when spores were blown on to the ears in a wind tunnel the former group did not become infected, whereas the latter did, infection being increased 50% when water was dropped on to the ears the next day.

Hashioka (Y.). **Vicissitude of air-spora of Erysiphe graminis due to fungicidal dusting in the mildew-affected Barley field.** —*Res. Bull. Fac. Agric. Gifu Univ.* 11, pp. 43–49, 4 graphs, 1959. [Jap. summ.]

The residual effect of fungicidal dusts applied to field barley infected by *E. graminis* [cf. **35**, 883] was examined from the samples of air spora above the field. The extent of fungitoxicity could be correlated with the percentage of distorted conidia found among the spores trapped. The air spora showed a very prompt reaction to dusting, but the gradual and accumulative disease development was only roughly paralleled by the air spora, which tended to be explosive and transitional, dissemination of spores being largely dependent on weather conditions and the nutrient status of the host. The type of fungicide applied had more effect than the time of application. D.P.C. (karathane) and inorganic S were most effective, barium polysulphide and zineb [**35**, 94] less so. Application of the less efficient fungicides at concs. which do not kill the fungus resulted in much more abundant spora later in the season than from the unsprayed, probably because of delay in the formation of perithecia [**39**, 407]. In order to reduce infection throughout the whole cultivation period more than 2 applications of the more efficient fungicidal dusts is recommended.

Sakurai (H.) & Hirata (K.). **Some observations on the relation between the penetration hypha and haustorium of the Barley powdery mildew and the host cell. V. Influence of water spray on the pathogen and the host tissue.**—*Ann. phytopath. Soc. Japan*, **24**, 4, pp. 239–245, 4 fig., 1959. [Jap. Abs. from Engl. summ.]

In further studies [cf. **39**, 226], when separate conidia or conidial chains of barley

powdery mildew [*Erysiphe graminis*] were placed in water they lost their protoplasmic and vacuolar structure and died. Some broke at the 'shoulder' or burst violently: hyphae from the margin of a pustule often broke at the tip end when placed in water. When infected leaves were sprayed with water, drops of various sizes were retained on top of the conidial chains, sticking them together by breaking the outer wall layer with the exposure of the inner sticky one. Spraying with water for more than a week destroyed the fungal cells almost completely except the marginal hyphae of pustules, which produced conidia several days later. Such spraying for a few days produced yellowing or browning of the epidermis and the tissues under the pustule; the discoloration became extensive and intense if spraying was continued. The cells which became intensely discoloured early did not always contain haustoria nor were they in contact with infected cells; they were often stomatal and inner mesophyll cells and those surrounding vascular bundles. Yellow, viscous drops which appeared on the surface of mesophyll cells before discoloration enlarged and turned brown; cells with walls in contact with the drops became discoloured but remained turgid for some time. Their death may be caused by abnormal physiological conditions brought about by the accumulation of materials from the vascular bundles which were not utilized by the pathogen, killed or weakened by the spray.

Favret (E. A.). **Spontaneous and induced mutations of Barley for the reaction to mildew.**—*Hereditas, Lund*, **46**, 1-2, pp. 20–28, 1 graph, 1960. [15 ref.]

At the Inst. Fitotecnia, Castelar, Argentina, mutations in barley for immunity from or resistance to *Erysiphe graminis* [**37**, 158] were induced by gamma-rays, fast neutrons, and formaldehyde; the mutation frequency for resistance increased exponentially when plotted against dose. Mutations for susceptibility were spontaneous, and a slight increase in their frequency, statistically insignificant, was obtained with ethylene oxide or gamma-rays.

Wiberg (A.). **Physiological races of Erysiphe graminis DC. f.sp. hordei Marchal in Sweden.**—*Phytopath. Z.*, **38**, 2, pp. 153–160, 1960. [Germ. summ.]

At the Royal agric. Coll., Uppsala, 12 physiologic races were obtained from 67 conidial samples from barley collected in S. and S.E. Sweden in 1958. The same differential vars. as in Germany [**37**, 277] were used, as well as the same nomenclature and grouping. Of the races found, A_6 and A_7 may be new. B_4 was isolated from ascospores. D_1 and C_2 were obtained from one perithecium, while another gave A_2, A_6, A_7, and D_1.

Krzysch (G.) & Eberhardt (W.). **Die Bekämpfung des Getreide-Mehltaues (Erysiphe graminis D.C.) durch ernährende Blattspritzungen.** [The control of cereal mildew (*E. graminis*) by nutritional leaf sprays.]—*Z. PflErnähr. Düng.*, **88 (133)**, 3, pp. 193–202, 1960.

In pot experiments at the Institut für Acker- und Pflanzenbau der Technischen Universität, Berlin, in 1956 and 1957, summer barley was protected by spraying the leaves with 2–2·6% superphosphate, Hoechst complete fertilizer, KNO_3, or N MgO with the addition of 0·15% of the wetter hostapon. The same compounds effectively controlled established infection, as also did K_2SO_4, $MgSO_4$, $(NH_4)_2SO_4$, KNO_3, NH_4NO_3, primary KH_2PO_4, and primary $MgH_4(PO_4)_2$. $2H_2O$. In small-scale field trials the treatments gave equally good results on summer and winter vars.

Kartoshkina (Mme N. F.). Мучнистая роса злаков в Ленинградской области. [Powdery mildew of cereals in the Leningrad region.]—*Bot. Zh. S.S.S.R.*, **45**, 6, pp. 918–921, 1960.

Ecological and physiological studies of *Erysiphe graminis* revealed that in winter

cereals the mycelium overwintered on sprouts, and in grasses at the level of the collar. Soil fertilization and seed treatment of winter wheat D-425 increased both yield and mildew incidence [but cf. **37**, 765]; only compost+superphosphate (both at 2,000 kg. ha.), which stimulated the mildew relatively little, appeared advantageous. The perfect state of *E. graminis* was observed on 10 hosts which are listed.

Benada (J.). **Skvrnitá nekróza Ječmene.** [Spot necrosis of Barley.] —*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 205–210, 2 pl. (7 fig.), 1960. [Russ., Germ. summ.]

Symptoms of this disease observed near Brno, Czechoslovakia, were dark brown dash- or dot-like spots on leaves decreasing in number towards the base and the drying of the leaves from the top. Investigations by Coll. Agric., Brno, suggested that the cause had been a toxic effect of B contained in the brown coal (or lignite) ashes strewn on the soil.

Dobretsov (A.). Борьба с закуклиганием Овса. [The control of 'zakuklivanie' of Oats.] Сел. Хоз. Сибири [*Sel. Khoz. Sibiri*], **5**, 5, pp. 24–25, 1960.

Delphax [*Delphacodes*] *striatella* [**26**, 13] is reported to be the vector [of oat pseudorosette virus: **39**, 22]. The appearance of the disease is also influenced by sowing time. At the Krasnoyarsk sci. Res. Inst. for Agric., 3 norms (4, 5, and 6 million germinative seeds ha.) of var. Zolotoĭ Dozhd' at different sowing times (May 1, 10, and 20) were tested. When the opt. norms (5–6 million) were used the disease was reduced almost 2-fold. In 3 yr. out of 4 infection was highest in the early sowings. Late sowing (middle and end of 3rd decade May) produces unripe grain and heavy crown rust [*Puccinia coronata*: **36**, 91] infection. Pre-sowing heat treatment at 25–26° [C.] for 2 weeks gave 8·7–17·1% increase in yield, reduced the disease by 1–3, and accelerated the appearance of shoots by 2–3 days; 76–86% disease reduction was obtained by dusting with 12% hexachlorane (15–20 kg./ha.), firstly at the full emergence of the shoots, and 2 applications 5 days later.

Wahl (I.). **Physiologic races of Oat crown rust identified in Israel in 1956–59.**—*Bull. Res. Coun. Israel*, Sect. D, **8**, 1, pp. 25–30, 1959.

Among 115 collections of *Puccinia coronata* on oats [**38**, 363] examined at the Hebrew Univ., Rehovot, the race group 276–264–263 occurred most frequently (in 43). Of the 22 physiologic races isolated 9 (Nos. 311–319) were new; 6 of these, forming a group, infected Santa Fe but not Landhafer, while another group (2 races) was virulent on both vars.

Sanderson (K. E.). **Inheritance of reaction to several races of crown rust, Puccinia coronata avenae Erikss. in two crosses involving Ukraine Oats.**—*Canad. J. Pl. Sci.*, **40**, 2, pp. 345–352, 1960.

Data are presented from the Canada Dept Agric., Winnipeg, Man., concerning the reactions of Ukraine (resistant to race 263) [**37**, 350, 405] and Garry oats to races of *P. coronata*. Ukraine carries 2 dominants, one governing resistance to 10 races and the other to race 263. The resistant reactions of Garry and Ukraine are inherited independently. Some F_3 lines from Fortune × Ukraine and Garry × Ukraine were selected which combined the field resistance to crown rust (*P. coronata*), including race 263, of either Ukraine or Garry with the field resistance of Garry to stem rust [*P. graminis*].

Zillinsky (F. J.) & Derick (R. A.). **Crown rust resistant derivatives from crosses between autotetraploid Avena strigosa and A. sativa.**—*Canad. J. Pl. Sci.*, **40**, 2, pp. 366–370, 1 pl., 1960.

Hexaploid derivatives from F_4 and F_5 progenies of crosses between *A. strigosa* var. C.D. 3820 [**39**, 302] and 2 oat vars., Abegweit and Victory, from breeding tests at

the Canad. Dept Agric., Ottawa, were resistant to races of crown rust [*Puccinia coronata*: see above], including 264, 274, and 290. The resistant hexaploid derivatives resemble and can be crossed with common oat vars. and genes from diploid spp. can thus be used to improve common oats.

Bartoš (P.) & Zemánek (J.). **Účinnost anaerobního moření proti prašné sněti Ovesné.** [Efficiency of anaerobic treatment against loose smut of Oats.]—*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 227–236, 1960. [Russ., Germ., Engl. summ.]

In field experiments by the Res. Inst. of Plant Protection, Ruzyně, Czechoslovakia, effective control of loose smut [*Ustilago avenae*] was obtained by 2-hr. soaking of the seed at 22° C. followed by storage in air-tight bottles for 2 days at 22° or 1 day at 26° [cf. **37**, 583]. Anaerobic treatment has a disadvantage of reducing the viability of the seed: in 5 vars. the stands were thinner by 10 and 50% if the seed had been treated for 2 and 3 days, respectively.

Pringle (R. B.) & Braun (Armin C.). **Isolation of victoxinine from cultures of Helminthosporium victoriae.**—*Phytopathology*, **50**, 4, pp. 324–325, 1960.

A description from the Rockefeller Inst., N.Y. City, of the procedure for isolating free victoxinine [**37**, 473] from a culture filtrate and comparing its toxicity with the intact toxin [cf. **39**, 303]. Victoxinine was readily obtainable from culture filtrates of poor or non-toxin producing isolates of *H. victoriae* and proved about 7,500 times less toxic w./w. basis than the intact *H.* toxin, but both toxin-resistant (Clinton) and -susceptible (Park) oats were equally sensitive to it. Addition of 0·1% ethanol increased the toxicity to both vars. tenfold, though ethanol alone was non-toxic at less than 1%.

Hooker (A. L.). **Sources of resistance to the Septoria disease of Oats. Inheritance of reaction to Septoria avenae in Oats.**—*Agron. J.*, **52**, 3, pp. 137–138, 139–143, 1960.

Several early or midseason oat vars., mostly types of Kherson, Red Rustproof, Silvermine, and Swedish Select, had consistently low disease ratings during 3 yr. under natural infection by *S. avenae* [*Leptosphaeria avenaria* f.sp. *avenaria*] at 2 locations in Wisconsin and under inoculation at a 3rd location [**37**, 279] and may constitute promising breeding stock.

In the F_3 and F_4 of 2 resistant × susceptible oat crosses and the F_2 of 4 others the heritability estimates for leaf infection, stem infection, and heading date were high. Later strains tended to develop less infection. Reaction to the disease should be treated as a quantitative character.

Clark (R. V.) & Zillinsky (F. J.). **Epidemiology studies on the Septoria disease of Oats.**—*Canad. J. Bot.*, **38**, 2, pp. 93–102, 1960.

At the Genetics and Plant Breeding Res. Inst., Canada Dept Agric., Ont., ascospores of *Leptosphaeria avenaria* f.sp. *avenaria* [**36**, 464 and above] were found to cause primary infection of oats and also widespread development of the disease through the season. Macrospores produced in leaf lesions caused secondary spread and the subsequent development of the black stem phase of the disease. Microspores appeared to be of little importance in initiation and development. Seed-borne infection was of no importance in the epidemiology of the disease and the soil did not appear to be a source of inoculum.

Clark (R. V.) & Drayton (F. L.). **The pathogenicity of isolates of Septoria avenae f.sp. avenae.**—*Canad. J. Bot.*, **38**, 2, pp. 103–110, 1 pl., 2 graphs, 1960.

All isolates of *Leptosphaeria avenaria* f.sp. *avenaria* [see above] obtained from

various sources in U.S.A. and Canada 1955–57 were pathogenic in the greenhouse on selected vars. of oats (Abegweit, Lanark, Rodney, C.D. 4090, C.D. 5924, and 5055–46), with no differential reaction, but there was great variability in virulence within all groups of isolates. Race differences were not demonstrated and there was no correlation between disease ratings of the isolates and the considerable variations in the dimensions, septations, and numbers of macrospores produced by them on oat-leaf agar.

Marshall (Gillian M.). **The incidence of certain seed-borne diseases in commercial seed samples. II. Ergot, Claviceps purpurea (Fr.) Tul., in cereals.**—*Ann. appl. Biol.*, **48**, 1, pp. 19–26, 1 graph, 1960.

In further work at the Official Seed Testing Sta., Cambridge [cf. **39**, 21], an examination of the records of the incidence of ergot (*Claviceps purpurea*) [cf. **35**, 872 *et passim*] in commercial cereal seed samples submitted from 1918–57 showed that rye was more frequently contaminated than wheat [cf. **29**, 551] or barley and that ergots were only occasionally found in oat samples and always from grass. A rather high proportion of ergot-contaminated rye samples occurred every 8–10 yr., associated apparently with high R.H. and low max. temp. in June. Similar trends were found for wheat and barley. There was no indication of varietal differences in the susceptibility of rye or barley, but spring wheat vars. appeared to be more frequently contaminated than winter ones.

Hecht (W.). **Studie über Primär- und Sekundär-Infektionen bei der Kultur von Claviceps purpurea Tul.** [Study of primary and secondary infections in the culture of *C. purpurea*.]—*Qual. Plant. Mater. veg.*, **7**, 1, pp. 39–54, 1960. [Engl. summ.]

In this further study [cf. **34**, 292] the results (not sufficient for statistical treatment) from various rye vars. in a variety of climates (Central Europe and Spain) showed that extension of secondary infection depends mainly on the atmospheric conditions which influence honeydew production, its duration, and the extent and development of infection. Differences between rye vars. were most pronounced in the polyploids. There were noticeable differences in the number and wt. of sclerotia of 4 'chemical' strs. of divergent quality, but not between 4 of equal quality.

Gjerstad (G.). **Intermediary metabolism of ergot. I. Amino acid metabolism.**—Reprinted from *J. Amer. pharm. Ass.*, **48**, 8, 2 pp., 2 diag., 1959.

There was no appreciable qualitative difference in the total amino acids produced by a str. of *Claviceps purpurea* [cf. **35**, 601] when growing on rye and when tested in submerged culture at Univ. Texas, Austin, but the cultures were richer in alanine and the rye sclerotia richer in glutamic acid. Tryptophane, thought by some workers to be the precursor of all ergot alkaloids, was not detected in any of the cultures.

Matsunami (S.) & Tanda (S.). **On the artificial culture of ergot and pigment formation.**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, p. 11, 1959. [Jap.]

It has been thought that there is a correlation between colour tone and alkaloid content of ergot [*Claviceps purpurea*: cf. **39**, 295] sclerotia. In culture at Tokyo Univ. Agric. different C sources caused growth variations but no colour change. Inorganic N sources, ammonium lactate, oxylate, and succinate, glutamine, and asparagine impeded growth. With $NaNO_3$ a pale purple pigment developed, from which it is presumed that Na influences pigment formation. In organic and inorganic liquid cultures many conidia were produced. In onion extract a pigment identical with the ergot one formed. Pigment density increases when it is in contact with the air.

Chesneau (J. C.). **Lutte contre les ennemis et les maladies du Maïs. Observations sur la campagne 1959 en France.** [The control of Maize pests and diseases. Observations on the 1959 season in France.]—*Déf. Vég.*, **14**, 80, pp. 11–16, 1960.

In France 1959 was an exceptional year inasmuch as extreme drought prevailed in the central areas, the region round Paris, and the N.E., into which maize-growing has recently been extended. In the S.W., the traditional maize-growing area, intense humidity was experienced. Temps. were above normal over most of France. Some late outbreaks of *Ustilago maydis* [cf. **37**, 160] occurred in central France and near Paris. *Gibberella zeae* [loc. cit. and below] and *Fusarium* sp. are becoming progressively less prevalent as a result of seed treatment. Severe outbreaks of *Helminthosporium turcicum* [loc. cit.] in the S.W. caused appreciable loss of yield when they occurred early. The American vars. Torva 4417 and Min. 706 were very susceptible, the new French hybrids being more resistant.

Messiaen (C. M.), Lafon (R.), & Molot (P.). **Nécroses de racines, pourritures de tiges et verse parasitaire du Maïs.** [Root necroses, stalk rots, and parasitic lodging of Maize.]—*Ann. Épiphyt.*, **10** (*1959*), 4, pp. 441–474, 24 fig., 1 diag., 6 graphs, 1960. [Engl. summ. 25 ref.]

Studies at the Station de Pathologie végétale, C.R.A. du Sud-Ouest, Pont-de-la-Maye, France, showed that maize stalk rot and lodging [**37**, 407; cf. **39**, 168, 304] are caused by a complex of fungi. *Colletotrichum graminicola* penetrates directly and also, with *Gibberella zeae* [cf. above], through the holes of borers (*Pyrausta nubilalis*); *G. zeae* also enters through the roots, with other soil fungi. Primary root invaders not penetrating the stalk are listed, as are fungi which invade the matured stalk. The pathogenicity of *G. zeae* (replaced in N. France by *Fusarium culmorum*), *Phaeocytosporella* [*Phaeocytostroma*] *zeae*, *Phialophora radicicola*, *Pyrenochaeta terrestris*, *Pythium debaryanum*, and *P. graminicola* [map 296] was proved on sterile roots of maize seedlings; inoculations of maize roots in land not previously sown with maize with *G. zeae* and *Phaeocytostroma zeae* also gave positive results.

The pathogenic fungi are described and the factors involved in resistance [loc. cit.], including the correlation between stalk susceptibility to *G. zeae* and to *Colletotrichum graminicola* [cf. **36**, 184] and between stalk sugar content and resistance, are discussed. The paper concludes with recommendations on breeding for resistance.

Huguenin (B.). **La 'rouille américaine' du Maïs due au Puccinia polysora Underw.** ['American rust' of Maize due to *P. polysora*.]—*Rev. Mycol., Paris*, **24**, 4, pp. 289–323, 2 fig., 3 maps, 1959. [73 ref.]

This useful survey covers the history and geographical spread, with special reference to Africa [cf. **35**, 11; **38**, 591 *et passim*]; etiology; symptoms and assessment of degree of susceptibility [cf. **37**, 406]; transmission; economic importance; and control, with special reference to breeding for resistance [cf. **39**, 570 *et passim*].

Leont'eva (Mme Yu. A.). Пузырчатая головня и химическая прополка Кукурузы. [Blister smut and herbicidal treatment of Maize.]

Solodovnik (M. G.). Эффективность препаратов в борьбе с пузырчатой головней Кукурузы. [Effectiveness of chemicals in the control of blister smut of Maize.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 6, pp. 24–25; 25–26, 1960.

In 4 yr. tests by Kuĭbyshev agric. Inst. the favourable effect of 2,4-D on the development of blister smut [*Ustilago maydis*: **39**, 571] was mitigated by combining this

chemical with thiram [cf. **38**, 690] and 12% GKhTsG (both at 1%) sprayed 2–3 times between mid-May and the beginning of July, the av. incidence in vars. B-41, Dnepropetrovskaya, and Malyshevskaya being reduced by 4·7, 7·4, and 11·8%, respectively. The effect was greater in wet years, and it is assumed that the 2 last-named ingredients suppressed the vector population on the weeds. The use of the mixture instead of 2,4-D alone generally resulted in an increase in ear yield, which in Dnepropetrovskaya amounted to 10% in heavily infested stands.

At Brest regional State agric. Sta. seeds of the hybrid VIR 25 heavily inoculated with spores were immersed 1 week before sowing for 10–15 min. in one of the following solutions: 50% thiram+12% gamma-isomer of GKhTsG, 50% thiram+10% heptachlor [loc. cit.] (both at 100, 200, and 400 g./100 kg.), 0·3% K permanganate, 0·1% technical penicillin, 200 g. 100 kg. mercuran, and 200 g./100 kg. granosan [**39**, 23]. In plants from the seed treated with compounds containing thiram and with K permanganate smut occurred in 13·4–14·8%, as compared with 26·3% of the control; in addition av. viability and height of the plants was greater and yield (both green matter and ears) rose by up to 83·8%.

Saluns'ka (Mme N. I.) & Rudenko (L. P.). Використання фунгіцидів для знищення спор пухирчастої головні в ґрунті. [The use of fungicides for destroying spores of blister smut in the soil.]—*Допов. Укр. Акад. сіл.-гос. Наук* [*Dopov. Ukr. Akad. sil.-hos. Nauk*], **2**, 2, pp. 37–40, 1 fig., 1960. [Russ. summ.]

In lab. trials at the Ukrainian sci. res. Inst. for Plant Protection, Kiev, selinon was most effective against chlamydospores of blister smut [*Ustilago maydis*: cf. above] with surface spraying at 1,000 l. ha. In 1957–58 in field tests on maize var. Voronezhskaya 76 at 750 l. ha. it reduced infection 2·5-fold, and at 1,500–3,000 l./ha. over 11-fold.

Wilcoxson (R. D.) & Sudia (T. W.). **The influence of gibberellic acid on seedling blight of Corn.**—*Plant Dis. Reptr*, **44**, 5, pp. 312–313, 1 fig., 1960.

At Univ. Minn., St. Paul, immersions for 12 and 24 hr. of seeds of the maize hybrid AES-202 and the inbred line W-10 in 5, 10, and 20 p.p.m. gibberellic acid resulted in leaf and root length increase and better growth of seedlings, but also in an enhanced severity of blight attack in plants from seed inoculated with a mycelial suspension of *Fusarium graminearum* [*Gibberella zeae*: **38**, 593].

Robert (Alice L.) & Sprague (G. F.). **Adaptation of the Corn leaf blight fungus to a resistant and a susceptible Corn host.**—*Phytopathology*, **50**, 4, pp. 261–263, 1960.

In further studies at U.S. Dept Agric. [cf. **39**, 571] 25 monoconidial isolates of *Helminthosporium turcicum* (*Trichometasphaeria turcica*) from the susceptible inbred maize K 64 and the resistant CI. 64 were inoculated on to the same vars. (spore suspension in the leaf whorls at 7 weeks) and mean infection scores (scale 0–5) were 1·81–2·08 for isolates from K 64 and 1·79–2·07 from CI. 64. Virulence of isolates from the 2 sources was significantly different on CI. 64 but not on K 64. The isolates from 1 host tended to be more pathogenic on that host, though some from 1 source did not follow the average pattern. The results further confirm the indication that the varying reaction of the pathogen to different host plants arises from genetic influences of the fungus apart from genetic differences in the hosts.

Forbes (I. G.). **Leaf stripe of Sweet Corn and Maize.**—*N.Z. J. Agric.*, **100**, 1, p. 86, 1960.

In N.Z., according to the Dept Agric., Dunedin, only *Helminthosporium turcicum* is responsible for leaf stripe, being severe sometimes in the Auckland and Gisborne

districts. None of the commercial vars. of sweet corn available at present is resistant.

Grancini (P.). **I nemici naturali della maiscoltura.** [The natural enemies of Maize plantings.]—*Agricoltura*, **8**, 5, pp. 81–85, 7 fig., 1959.

In the 2nd part of this paper work at the Stazione di Maiscoltura, Bergamo, Italy, is stated to have shown that attacks of 'rough dwarf' of maize [cf. **38**, 475] may occur when the plants are very young or much later. In young plants, especially, the 1st symptom is a dark green discoloration of the leaves. Attacks most commonly occur from mid-May until the end of June.

In the 3rd part *Helminthosporium turcicum* [cf. **36**, 692] is stated to be prevalent every year in N. Italy. Infection is favoured by high atmospheric humidity. Breeding for resistance is in progress at Bergamo.

Lichtwardt (R. W.) & Barron (G. L.). **A quantitative deterioration rating scale for shelled Corn.**

Barron (G. L.) & Lichtwardt (R. W.). **Quantitative estimations of the fungi associated with deterioration of stored Corn in Iowa.**—*Iowa St. Coll. J. Sci.*, **34**, 2, pp. 139–146, 5 graphs; pp. 147–155, 1 fig., 1959.

The criterion proposed [cf. **38**, 141] is the *Aspergillus-Penicillium* or 'A-P' value, which is the sum of the percentages of kernels infected internally by each sp. of *Aspergillus* and *Penicillium* in the sample. Approx. the same relative values can be obtained by confining study to the *A. glaucus* group [**39**, 573] and the *P. cyclopium–P. viridicatum* series, but in some instances, especially where there is advanced deterioration, other spp. may be significant. A chart, based on the findings in 600 samples over 2 yr., shows the relationship between deterioration ratings, on a scale 0 (excellent condition) −6 (extreme deterioration), and both percentage germination and the 'A-P' value. Where the rating was 6 the percentage germination did not exceed 40 and the 'A-P' value exceeded 120.

The 2nd paper is based on experiments in which maize (surface-sterilized by 30 sec. immersion in 70% alcohol, followed by 2 min. in 1 1,000 $HgCl_2$ before rinsing) was divided into 25-g. samples, which were ground (in a Sargent centrifugal wet mill No. 2) with 250 ml. of 0·2% sterile agar for 35 min. Dilution series from this primary suspension were plated out on agar containing 2% malt extract and 6% salt. In all 256 samples, representing 3 harvest yr. in 95 counties in Iowa, were examined in 1956. Collections of 1953 grain rated as mouldy had significantly higher mould counts than 1952 grain with the same rating, despite the fact that the latter had been stored 1 yr. longer. The composition of the fungus flora causing deterioration was approx. the same in the 2 yr. The *A. glaucus* group appeared to contain the spp. most important in deterioration, irrespective of whether the criterion was frequency of appearance as dominants and co-dominants, or total counts. *A. ruber* was the most ubiquitous, but *A. restrictus*, *A. chevalieri* var. *intermedius*, and perhaps *A. amstelodami* were probably more important in deterioration. Approx. 25% of the counts were due to *A.* spp. other than *A. glaucus*, *A. candidus* being perhaps the most important single sp. Approx. 25% of the total counts were attributable to *Penicillium* spp., *P. cyclopium* being perhaps the most important. *Candida* was the only genus, apart from *Aspergillus* and *Penicillium*, which appeared to be responsible for any serious deterioration.

Walker (R. K.). **Narfarms vs. hoja blanca.**—*Rice J.*, **63**, 2, pp. 7, 29, 32, 3 fig., 1960.

During 1957–59, at Narfarms Inc., Venezuela, the rice vars. Missouri R-500 [**38**, 257], Lacrosse [**39**, 574], Lacrosse × 253, and C.I. 9416 [loc. cit.], regarded as having

commercial possibilities as well as resistance to hoja blanca [**39**, 169], were increased as rapidly as possible. Of these, the last two are the most promising. Experience suggests that the practice of elimination of susceptible head rows will yield highly resistant strs. of these vars.

Padmanabhan (S. Y.) & Ganguly (D.). **Breeding Rice varieties resistant to blast disease caused by Piricularia oryzae Cav. I. Selection of resistant varieties from genetic stock.**—*Proc. Indian Acad. Sci.*, Sect. B, **50**, 5, pp. 289–304, 1959.

In the programme initiated in 1948 at the Central Rice Res. Inst., Cuttack, India, to examine rice vars. for resistance to blast disease [see below], inoculation is used for rapid screening at the seedling stage, while field tests are carried out at the seedling, post-transplanting, and neck emergence stages under conditions highly favouring the disease. Results are tabulated. The vars. found resistant or moderately resistant in these trials at Cuttack are being tested by the rice research centres of other Indian states.

Abdul Samad (A.) & Shanmugasundaram (A.). **Evolution of blast resistant Rice—past, present and future.** Abs. in *Madras agric. J.*, **47**, 1, pp. 32–33, 1960.

Adt 25, a hybrid str. of Sirumani type from a cross between Adt 2 and Co. 4, resistant to blast [*Piricularia oryzae*: **39**, 24], was released at Coimbatore in 1952. A more comprehensive hybridization scheme was started in 1940 with the resistant parent Co. 4 and medium and short duration strs. Selection of the progenies under heavy manuring and heavy disease bombardment gave 2 resistant cultures, 6522 of short duration and 6538 medium (both heavy yielding and blast-resistant), which have undergone a 3 yr. test in cultivators' fields.

Harada (Y.), Kumabe (K.), Kagawa (T.), & Sato (T.). **Antifungal activity of antipiriculin for several growing stages of Piricularia oryzae. The inhibitory effect of antipiriculin-A and some fungicidal chemicals on the organic acid and energy metabolism of Piricularia oryzae. The effect of antipiriculin A and phenyl mercuric acetate on the nitrogen metabolism of Piricularia oryzae.** —*Ann. phytopath. Soc. Japan*, **24**, 5, pp. 247–254, 12 graphs; pp. 255–264, 27 graphs; pp. 265–272, 1959. [Jap. Abs. from Engl. summ.]

In work at the Kyowa Fermentation Industry Co., Shizuoka, antipiriculin-A formerly antimycin A (AP) [**39**, 306], blastimycin (BM), and phenyl mercury acetate (PMA) strongly inhibited germination of *P. oryzae* spores in the early incubation stage, but not after 24 hr. AP and BM were somewhat less effective than PMA owing to lower solubility in water. Growing mycelium was also inhibited by all,but not in the stationary growth phase except by AP-emulsion; sporulation was not inhibited. Since PMA inhibited fungal growth at 0·05 μg./ml. and AP at 0·1 it is considered that AP-emulsion spray will give satisfactory field control of blast.

The 2nd paper notes that AP, BM, and PMA inhibited oxidation of some organic acids in the tri-carboxylic acid cycle by the enzyme solution of *P. oryzae*, that of succinate or lactate being notably inhibited by AP. Endogenous respiration was not inhibited, except by highly conc. PMA. Both AP and BM specifically inhibited the succinoxidase system of *P. oryzae* and PMA also inhibited the succinic dehydrogenase and cytochrome oxidase systems.

The 3rd paper shows that the 3 chemicals inhibited oxidation of amino acids by *P. oryzae* and also the transamination between α-ketoglutaric acid and alanine 18 hr. after incubation. Transamination between α-ketoglutaric and aspartic acid was moderately inhibited even by PMA. In extracted enzyme solution, however, the effects of AP and MB on the 2 reactions were not confirmed, but strong inhibition by PMA was detected.

Misato (T.), Ishii (I.), Asakawa (M.), Okimoto (Y.), & Fukunaga (K.). **Antibiotics as protectant fungicides against Rice blast. (2) The therapeutic action of blasticidin S.**

Misato (T.), Okimoto (Y.), Ishii (I.), Asakawa (M.), & Fukunaga (K.). **Studies on selective toxicity of fungicides. (1) Correlation between the fungicidal effect in vitro and the protectant effect in vivo of various fungicides against Rice blast (Piricularia oryzae).** —*Ann. phytopath. Soc. Japan*, **24**, 5, pp. 302–306, 4 graphs; pp. 307–312, 7 graphs, 1959. [Jap. Abs. from Engl. summ.]

In further studies [cf. **39**, 306] blasticidin S and phenyl mercury acetate (PMA) completely inhibited *in vitro* germination of spores of *P. oryzae* [cf. above] at 1 μg./ml. Both inhibited sporulation to almost the same extent: blasticidin S inhibited mycelial growth (at 1 μg.) more effectively than PMA (10 μg./ml.) in shaken liquid media. The activity of blasticidin S on rice leaves after 4 days was about $\frac{1}{5}$ of its original value [cf. **39**, 281]. When the 1st internode of the rice seedling was coated with paste containing 2% blasticidin S, about 30 μg./g. of the antibiotic was found in the stems and leaves above the internode 1 day later. In the greenhouse application of 5 μg./ml. of blasticidin S to rice leaves 1 or 2 days after inoculation with spores of *P. oryzae* was more effective in controlling blast than 20 μg./ml. PMA: however, when applied 4 days before inoculation, PMA was more effective.

Of 7 chemicals tested, PMA, antimycin A, and blasticidin S were the most effective against blast in the field and markedly inhibited mycelial growth and sporulation. In the laboratory spore germination was completely inhibited by all 7 and their min. inhibitory concs. (except that of $CuSO_4$) were almost the same, though the inhibition zones of the 3 satisfactory in the field were larger.

Hashioka (Y.) & Ikegami (H.). **Phytopharmacological studies of the Rice diseases, VI. Infectivity of the conidia of the Rice blast fungus treated with the different fungicidal solutions.** —*Res. Bull. Fac. Agric. Gifu Univ.* 11, pp. 50–55, 4 graphs, 1959. [Jap. summ.]

In further studies [cf. **38**, 594] the loss of infectivity of conidia of *Piricularia oryzae* [cf. above], inoculated on to rice leaves and treated with 1–0·01 p.p.m. fungicides, varied with the duration of the treatment up to 10 min. but then became constant. Of the mercurials and $CuSO_4$ phenyl-mercuric acetate, ethylmercuric phosphate, corrosive sublimate, and methoxyethylmercuric chloride (MEMC) were effective in decreasing order: treatment for 5 min. with MEMC scarcely affected the infectivity of conidia. Of the organosulphur solutions thiram, zineb, and urbacide (methylarsine bisdimethyldithiocarbamate) affected infectivity in increasing order. The ratio of chronic to acute lesions produced on inoculation increased with the duration of the treatment and the conc. of the fungicides, and was higher following treatment with mercurials than with organosulphurs.

Ikegami (H.). **Studies on the false smut of Rice. III. The mode of occurrence of smut balls and estimation of damage in the diseased ears.**—*Res. Bull. Fac. Agric. Gifu Univ.* 11, pp. 56–63, 2 fig., 4 graphs, 1959. [Jap. Abs. from Engl. summ.]

In further studies [cf. **38**, 594] the occurrence of *Ustilaginoidea virens* in rice ears estimated from material collected from 10 fields of upland and lowland rice near Gifu, Japan, was more frequent on the lower part of the ear, the number of false smut balls in a cluster increasing with the number of infected grains/ear. The weights of (1) the balls, (2) the ear excluding smut balls, and (3) 1,000 kernels decreased with the increase of the number of balls/ear. The number of kernels/ear was almost constant in spite of the difference in incidence of infection.

Castellani (E.) & Golato (C.). **Spermospora subulata sul Riso.** [*S. subulata* on Rice.]—*Riv. Agric. subtrop.*, **54**, 1–3, pp. 7–13, 2 fig., 1960. [Engl. summ. 17 ref.]

In 1958 Fidelia rice growing in the province of Trujillo, Dominican Republic, developed an inflorescence infection, accompanied by severe leaf scald, at first thought to be due to heavy infection by *Helminthosporium oryzae* [*Cochliobolus miyabeanus*]. In addition to the spots caused by this pathogen, however, others, more elongated in the direction of the veins, but not confined between them, were present; these were chestnut or yellowish-brown, growing paler towards the edge, and round them the leaf tissues became yellow, later brown, finally drying up to a distance of a few mm. These latter spots bore conidia of *S. subulata* [**27**, 527], which appeared to augment the damage caused by *C. miyabeanus*. All attempts to isolate the fungus in pure culture failed.

[This information is also reported by E. Castellani in *F.A.O. Pl. Prot. Bull.*, **8**, 5, p. 57, 1960.]

De Gutiérrez (Lucy H.). **Leaf scald of Rice, Rhynchosporium oryzae, in Costa Rica.**—*Plant Dis. Reptr*, **44**, 4, pp. 294–295, 1 fig., 1960.

This record of *R. oryzae*, hitherto found only in Japan [cf. **34**, 482], is from the Inter-American Inst. of agric. Sci., Turrialba. The disease as it occurs in Costa Rica is described. It causes a seedling blight and lenticular or diamond-shaped leaf spots develop in a striking zonate pattern. Symptoms in general are as described by Caldwell for *R.* on other Gramineae [**17**, 22].

Batista (A. C.) & Bezerra (J. L.). **A Brazilian Sorghum rust caused by Sphaerophragmium sorghi n.sp.**—*Nova Hedwigia*, **2**, 1–3, pp. 345–347, 2 pl., 1960. [Port. summ.]

This rust on *Sorghum halepense* spikelets was found in the field at Agric. Exp. Sta., Caruarú, Pernambuco, in 1959. Small pustules formed and caused cracking of the tegument, hundreds of spikelets in the affected panicles being damaged. Teleutospores and uredospores of a *Sphaerophragmium* were present in the same sorus, which became erumpent and irregularly dehiscent and liberated a mass of blackish-brown spores which became brown-red when dry. Near the sorus were the immersed-erumpent, scattered or densely aggregate, conoid to sub-globose conidia, 115–180 μ diam. and 85–160 μ high.

Dagis (I. K.). Опыты по применению фитонцидов в борьбе с грибными болезнями растений. [Experiments in the use of phytoncides in the control of fungal plant diseases.]—*Darb. moks. Akad. Liet. TSR*, Ser. B, **16**, 4, pp. 211–223, 2 graphs, 1958. [Lith. summ.]

This is a fuller account of work at Inst. Biol., Vilnius, noticed in brief [**38**, 293]. The phytoncide distilled from leaves of *Pulsatilla pratensis* (10% conc.) completely inhibited the germination of spores of *Ustilago panici-miliacei* [*Sphacelotheca destruens*] when steeped for 3 hr. Field experiments showed that infection can be considerably reduced by steeping *Panicum* [*miliaceum*] seed in 5–25% distillate. A considerable reduction in infection was obtained by combining *Panicum* seed with ground *Brassica juncea* [**38**, 242], and up to 38% reduction by treatment with the volatile oil. The experiments are not yet sufficiently conclusive for the phytoncides to be recommended for use in agriculture.

Comelli (A.). **Les Agrumes en Israël.** [Citrus fruits in Israel.]—*Fruits d'outre-mer*, **15**, 3, pp. 129–138, 8 fig., 1960. [Engl., Germ., Span., Russ. summ.]

In the section on maintaining the health of the citrus crop (pp. 133–134) brief

notes are given on the virus diseases [**38**, 596 and below] xyloporosis and tristeza, 1st and 2nd in importance, and psorosis. Xyloporosis affects chiefly Shamouti orange grafted on sweet lime, but the symptoms are not very distinct, even on old trees, nor the damage very evident, though the short productive life of Shamouti orange on sweet lime (25 yr.) is considered to be due to their association. Subgrafting with sour orange gives a further 25 yr. of production. The effect of the disease may be aggravated by longitudinal cuts made in the bark to assist the growth of the stock. Tristeza is known to affect 15 citrus vars. in Israel but appears to be transmitted only by grafting; not all affected trees have as yet been eradicated. Stubborn disease symptoms [map 375] have not yet been observed in Israel.

Reichert (I.), Bental (A.), Ginsburg (O.), & Yoffe (I.). **Tristeza disease in native commercial Citrus trees in the Mediterranean.**—*F.A.O. Pl. Prot. Bull.*, **8**, 4, pp. 43–45, 3 fig., 1960. [12 ref.]

Whereas hitherto only a few cases of citrus tristeza virus have been found in the Mediterranean area, and these on citrus trees introduced from foreign countries [**36**, 22; **39**, 577], the authors (Agric. Res. Sta., Beit Dagan-Rehovot, and Agric. School, Mikve, Israel) report that some native Shamouti sweet orange trees on sour orange or sweet lime were recently found to be infected with tristeza virus in Israel, the 1st record of the disease on local sweet orange in the Mediterranean area. Of 8,000 Shamouti trees in an orchard on the coastal plain, 82 (of 20–60 yr.) were affected, the infection having apparently originated from diseased budwood.

Stolzy (L. H.). **Influence of irrigation on Phytophthora root rot.**—*Calif. Citrogr.*, **45**, 3, pp. 66, 76, 1960.

Comparison of different irrigation schedules at Univ. Calif. Citrus Exp. Sta. [**39**, 310] indicated that where *P.* spp. were present the wetter schedules gave larger plants and healthier roots than did the drier. It is concluded that the practice of drying out orchard soils to reduce root rot is unnecessary unless excess water has been added by rain or irrigation. It is important to avoid premature irrigations in the spring when roots are inactive; in general irrigations of shorter duration are recommended, with frequency based on instrument readings and adjusted to the season.

Klotz (L. J.), DeWolfe (T. A.), Rosedale (D. O.), & Garber (M. J.). **Growth of Navels on Troyer improved by disinfesting planting site.**—*Calif. Citrogr.*, **45**, 6, pp. 173, 179, 2 fig., 1960.

At Univ. Calif. Citrus Exp. Sta. the orchard chosen to determine the usefulness of treating Troyer citrange rootstocks in contaminated soil had a record of failure of navel orange on sweet orange rootstocks in 3 successive yr. (1955–57), and the soil yielded many *Phytophthora* isolates [**39**, 274 and above]. Circular basins round the trees for treatment with vapam or mylone were broken on the downhill ridge to conduct away surface water and so avoid contamination. The basin was flooded to a depth of 4 in. with 4S vapam (1 pint/pail of water). With 85% W mylone 9 oz. of powder were spread over the soil and flooded to a level of 4 in. The treated sites were dusted with 12·7% Bordeaux mixture on 7 and 27 Mar. to help delay recontamination by *P.* spp. Trunk circumference 6 in. above the bud union was measured on 23 July 1958, 8 Apr. 1959, and 28 Oct. 1959; the av. increase at treated sites after 437 days was 74% greater than in untreated. Such treatment, at approx. 90 cents/tree site, is economic. Care must be taken not to use contaminated water for irrigation.

[This information is also published in *Plant Dis. Reptr.*, **44**, 5, pp. 309–311, 2 fig., 1960.]

CONTENTS

AUTHORS' NAMES

Abdul Samad, 701
Agarwal, 671, 677
Alexander, 674
Ali, 658
Altares, 676
Ark, 661
Asakawa, 702
Ashton, 664
Barkai-Golan, 678
Barron, 700
Bartley, 684
Bartoš, 696
Bartsch, 669
Basile, 687
Basu, 672
Batista, 703
Batts, 693
Bawden, 681
Beliram, 677
Bell, 649
Benada, 695
Benetti, 641
Bental, 704
Bercks, 644
Bertossi, 672
Bezerra, 703
Bochow, 642
Booth, 678
Brady, 678
Braun, 696
Brian, 673
Buchli, 661
Burges, 670
Burkholder, 648
Butler, 685
Capozzi, 674
Carra, 668
Carter, 646
Carvalho, 683
Castellani, 703
Čermáková, 661
Channon, 642
Chelack, 686
Chesneau, 698
Chi, 641
Chou, K.-H., 641
Chou, S.-H., 641
Christensen, 691
Ciferri, 664
Clark, 696
Cleverdon, 659
Coleman, 656
Coley-Smith, 647
Comelli, 703
Condon, 648
Cooke, 669
Costa, 683
Creech, 680
Cuendet, 691
Dagis, 703
Dale, 683
Davis, 662
De Bruyckere, 663
De Gutiérrez, 703
Démétriadès, 675
Derick, 695
Desai, 659
DeWolfe, 704
Dickson, J. G. 690
Dickson, R. C., 649
Di Menna, 675
Dimond, 667
Dobretsov, 695
Donk, 679
Dowson, 659
Drayton, 696
Dudman, 684
Dunin, 664
Dyadechko, 661
Eberhardt, 694
Edgington, 667
Elenkov, 648, 649
Emeis, 669
Ernould, 643, 644
Etchells, 649
Ezdakova, 677
Faivre-Amiot, 673
Favret, 694
Fehérvári, 665
Felix, 678
Ferrero, 665
Fields, 646
Fitzgerald, 686
Flock, 649
Forbes, 699
Friedman, 660
Fukunaga, 702
Gambogi, 673
Ganguly, 701
Garber, 704
Gardner, 668
Geddes, 691
Ghose, 672
Gibbs, 681
Gillet, 665
Ginsburg, 704
Gjerstad, 697
Golato, 677, 703
Golubchuk, 691
Goodchild, 685
Goodman, 673
Gordon, 673
Gorlenko, 671
Gower, 681
Graham, D. C., 659
Graham, S. O., 689
Grancini, 700
Grela, 689
Groves, 667
Grylls, 685
Gurr, 680
Hagborg, 686
Hagedorn, 680
Haque, 679
Harada, 701
Hasan, 665
Hashokia, 693, 702
Hecht, 697
Henry, A. W., 690
Henry, P., 663
Hensley, 665
Hepple, 675
Heuberger, 673
Hirata, 693
Hiratsuka, 677
Hockenhull, 667
Hoffman, 681
Holevas, 675
Hooker, 696
Huguenin, 698
Ikegami, 671, 702
Illman, 680
Ingold, 679
Ishii, 702
Iton, 684, 685
Jacks, 668
Jaffe, 660
Kachalova, 689
Kagawa, 701
Kahn, 680
Kartoshkina, 694
Katsura, 671
Katznelson, 660
Keyworth, 642
Khristova, 649
King, 646
Klaptsova, 688
Kleczkowski, 681
Klement, 646
Klesser, 681
Klotz, 704
Knickmann, 676
Kohlmeyer, 677
Koštál, 691
Kotte, 659
Kristensen, 681
Krushcheva, 692
Krzysch, 694
Kuc, 648
Kulikov, 666
Kumabe, 701
Kurlina, 666
Lafon, 698
Laird, 649
Lambrech, 665
Last, 641
Latter, 679
Ledingham, 690
Lee, 662
Leonori-Ossicini, 687
Leont'eva, 698
Lessel, 680
Levine, 687
Lichtwardt, 700
Lindström, 666
Lister, 682, 684
Lovisolo, 641
Ludzack, 669
Lukashevich, 647
Lyuboshits, 688
Macfarlane, 641
Mach, 680
Machacek, 686
Malik, 693
Marcelli, 674
Marras, 646
Marshall, G. M., 648, 689, 697
Marshall, K. C., 674
Masago, 672
Masley, 649
Mässing, 665
Matsunami, 697
McClendon, 673
McGinnis, 680
Messiaen, 698
Miller, 666
Misato, 702
Misra, 679
Mohamed, 687
Moller, 646
Molnár, 647
Molot, 698
Morton, 692
Moustafa, 650
Murray, D. B., 684
Murray, J. S., 678
Nannfeldt, 676
Naumova, 687
Nema, 677
Nene, 683
Nichols, 684
Nicot, 678
Nienhaus, 667
Niklaus, 642, 647
Nishioka, 671
Nölle, 645
Okimoto, 702
Padmanabhan, 701
Papavizas, 691
Phillips, 681
Pirone, 641
Polyakov, 666, 688
Porter, B. R., 668
Porter, C. A., 683
Pospelov, 677
Potatosova, 678
Pound, 641
Pringle, 696
Pucci, 658
Ramakrishnan, 676
Rao, 643
Raymond, 649
Rayss, 677
Reichert, 704
Reiling, 646
Reinmuth, 642
Richardson, 666
Řídký, 688
Riegert, 660
Riley, 676
Robert, 699
Rod, 688
Roland, 686
Rollins, 668
Rosedale, 704
Rouatt, 660
Rudenko, 699
Russell, 692
Ryzhei, 688
Safařik, 669
Sagromsky, 671
Sakurai, 693
Sallans, 690
Saluns'ka, 699
Samšiňáková, 661
Sanderson, 695
Sato, 701
Sattar, 665
Săvulescu, 654
Scardavi, 664
Scharen, 645
Schley, 681
Schmiederknecht, 670
Schnathorst, 648
Schnicker, 663
Schutz, 642
Semeniuk, 690
Shah, 659
Shanmugasundaram, 701
Shekhurina, 661
Shepherd, 641
Shinkhede, 671
Shipinov, 666
Sidhu, 665
Sikura, 661
Simmonds, 690
Sims, 670
Skerman, 659
Soda, 659
Solodovnik, 698
Somers, E., 663
Somers, G. F., 673
Sprague, 699
Stalder, 642, 647
Staněk, 692
Staron, 673
Stauffer, 690
Stellmach, 644, 663
Steudel, 644
Stolzy, 704
Sudia, 699
Swarbrick, 684
Taber, 672
Tanda, 697
Telenga, 661
Tempel, 679
Thirumalachar, 643
Thompson, 661
Thornberry, 683
Thornton, 675
Thresh, 684
Timian, 686
Timline, 690
Tochihara, 643
Torgeson, 665
Tripp, 668
Tuma, 662
Tuite, 647
Tul'chinskaya, 674
Turner, E. M. C., 673
Turner, P. D., 685
Ujević, 692
Umbreit, 658
Uspenskaya, 671
Van der Veken, 681
Van Steyvoort, 643, 644
Vining, 672
Vintrová, 669
Vörös, 647
Wahl, 695
Walker, 700
Wallace, 686
Weber, 676
Weinstein, 683
Wenhardt, 690
Wenzl, 645
Whiteside, 674
Whittaker, 663
Wiberg, 694
Wilcoxson, 699
Windisch, 669
Yamamoto, 677
Yates, 664
Yoffe, 704
Zaleski, 689
Zarzycka, 643
Zemánek, 696
Zilinsky, 695, 696
Zitelli, 687

SUBJECT INDEX

Airborne fungi, 693
Antagonism, 674
Antibiotics, 661, 673, 674, 689, 701
Bacteria, 646, 648, 656, 659, 660, 677, 692
Books, 658, 659, 662, 667, 680
Deficiency diseases, 675, 676
Diseases and disorders of:
  Apple, 673
  Cacao, 656, 657, **684–685**
  Cereals, **685–700**
  Citrus, **703–704**
  Coconut, 656
  Coffee, 658
  Fruit, 650
  Hops, 652
  Insects, 661, 662
  Palms, 656, 657
  Potato, 656, 660
  Rice, 650, 656, **700–703**
  Sugar beet, **644–645**
  Sugar-cane, 657
  Textiles, 668
  Tobacco, 683
  Trees and timber, 641
  Vegetables, **641–650**, 652, 653, 660
Fungicides, 641, **662–667**, 699
General publications, 654, 667, 668, 669, 703
Hyperparasites, 678
Industrial and officinal fungi, 667
Legislation, 653, 670
Lists of fungi or diseases, 658, 676, 677, 678
Mycorrhiza and symbiosis, 692
Oil pollution, 676
Physiology, 647, 648, **670–673**, 676
Radiation, 672, 690, 695
Reports from Cawthron Inst., New Zealand, 655; E. Malling Res. Sta., 650; Exp. Sta. outdoor veg. cult., Netherlands, 652; Ghana, 657; Internat. Conf. on Seed Path., 650; Kenya, 656; Malaya, 656; N. S. Wales, 654; Nigeria (N. Region), 657.
Root rots, 646, 647, 648, 698
Sewage fungi, 669
Systematic mycology, 659, 677, 678, 679, 680
Technique, 669, 674, 680, 681
Virus diseases, 641, 643, 644, 647, 649, 652, 655, 656, **681–684**, 685, 686, 704
Yeasts, 669, 675

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